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ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MISS F/G 13/6  
ASSESSMENT OF LOW-GROUND-PRESSURE EQUIPMENT FOR USE IN CONTAINM--ETC(U)

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JUL 78 W E WILLOUGHBY  
WES-TR-DS-78-9

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1 OF 2  
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# SYNTHESIS OF RESEARCH RESULTS



## DREDGED MATERIAL RESEARCH PROGRAM



TECHNICAL REPORT DS-78-9

# LEVEL II



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ASSESSMENT OF LOW-GROUND-PRESSURE  
EQUIPMENT FOR USE IN CONTAINMENT  
AREA OPERATION AND MAINTENANCE

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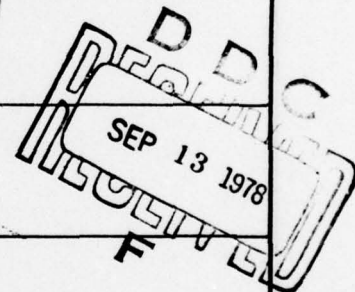
Technical Report No.	Title
DS-78-1	Aquatic Dredged Material Disposal Impacts
DS-78-2	Processes Affecting the Fate of Dredged Material
DS-78-3	Predicting and Monitoring Dredged Material Movement
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DS-78-8	Disposal Alternatives for Contaminated Dredged Material as a Management Tool to Minimize Adverse Environmental Effects
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Guidelines for the selection of equipment to operate in and around confined dredged material disposal areas were developed as part of the Dredged Material Research Program (DMRP). In the early phase of the DMRP, it was recognized that, in order to implement concepts for management of disposal areas to minimize adverse environmental impacts, equipment must be employed that can operate on very soft soils. In a three-phase study, the Mobility and (Continued)		



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20. ABSTRACT (Continued).

Environmental Systems Laboratory of the U. S. Army Engineer Waterways Experiment Station developed the guidelines by (a) compiling a catalog of low-ground-pressure equipment, (b) analytically predicting vehicle performance, and (c) verifying the predictions of the field condition. This report is a synthesis of the three studies. The equipment catalog is included as Appendix A. Guidance for performing required soils tests is contained in Appendix B.

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## PREFACE

This report is a synthesis of the results of research conducted from January 1974 to April 1977 by personnel of the Mobility Systems Division (MSD), Mobility and Environmental Systems Laboratory (MESL), U. S. Army Engineer Waterways Experiment Station (WES), Vicksburg, Miss. The research was conducted as part of the Dredged Material Research Program (DMRP) sponsored by the Office, Chief of Engineers, U. S. Army, and monitored by the Environmental Effects Laboratory (EEL), WES. The studies synthesized were conducted under DMRP Work Units 2C09A, B, and C, entitled "The Development of Concepts for Using Low-Ground-Pressure Construction Equipment for Containment Area Operation and Maintenance: Equipment Catalog, Performance Predictions, and Validation Tests," respectively. This report will also be published as Engineer Manual 1110-2-5000, dated 28 April 1978.

The studies were conducted under the general supervision of Messrs. W. G. Shockley, Chief, MESL; A. A. Rula, Chief, MSD; and E. S. Rush, Chief, Mobility Investigations Branch (MIB). The studies were under the direct supervision of Messrs. N. C. Baker, Task 2C Manager, and C. C. Calhoun, Jr., Disposal Operations Project Manager, and Dr. T. A. Haliburton, Geotechnical Consultant, EEL, under the general supervision of Dr. John Harrison, Chief, EEL. This report was compiled by Mr. W. E. Willoughby, MIB, with major contributions by Messrs. Calhoun and Charles E. Green, MIB. Ms. Dorothy P. Booth was editor.

COL G. H. Hilt, CE, and COL J. L. Cannon, CE, were Directors of WES during the conduct of these studies and preparation of this report. Mr. F. R. Brown was Technical Director.



## CONTENTS

	<u>Page</u>
PREFACE . . . . .	2
CONVERSION FACTORS, U. S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT . . . . .	4
PROBLEM DEFINITION . . . . .	5
Equipment Catalog . . . . .	5
Performance Predictions . . . . .	6
Assessment of Vehicles . . . . .	7
PURPOSE AND SCOPE . . . . .	8
CAUTION . . . . .	8
DEFINITIONS . . . . .	9
GUIDELINES FOR SELECTING EQUIPMENT FOR USE IN CONSTRUCTION, OPERATION, AND MAINTENANCE OF DISPOSAL AREAS . . . . .	11
Site Characterization . . . . .	11
Vehicle Characterization . . . . .	17
Vehicle Selection . . . . .	18
Examples of Use of Methodology . . . . .	22
Application . . . . .	30
REFERENCES . . . . .	31
APPENDIX A: VEHICLE CATALOG	
Index of Group I Vehicles . . . . .	A3
Index of Group II Vehicles . . . . .	A23
Index of Group III Vehicles . . . . .	A35
Index of Group IV Vehicles . . . . .	A47
Index of Group V Vehicles . . . . .	A57
Index of Group VI Vehicles . . . . .	A65
APPENDIX B: CARE AND USE OF SOILS TESTING EQUIPMENT . . . . .	
Cone Penetrometer . . . . .	B1
Hvorslev Soil Sampler . . . . .	B4
Remolding Equipment . . . . .	B6

CONVERSION FACTORS, U. S. CUSTOMARY TO METRIC (SI)  
UNITS OF MEASUREMENT

U. S. customary units of measurement used in this report can be converted to metric (SI) units as follows:

<u>Multiply</u>	<u>By</u>	<u>To Obtain</u>
cubic yards per hour	0.7645549	cubic metres per hour
degrees (angular)	0.01745329	radians
feet	0.3048	metres
feet per minute	0.3048	metres per minute
horsepower (550 ft-lbf/sec)	745.6999	watts
inches	2.54	centimetres
miles (U. S. statute) per hour	1.609344	kilometres per hour
pounds (mass)	0.45359237	kilograms
pounds (force) per square inch	6.894757	kilopascals
square inches	6.4516	cubic centimetres
tons (2000 lb mass)	907.18474	kilograms

ASSESSMENT OF LOW-GROUND-PRESSURE EQUIPMENT FOR  
USE IN CONTAINMENT AREA OPERATION AND MAINTENANCE

PROBLEM DEFINITION

1. Recent dramatic increases in the amount of land used for confined dredged material disposal areas have caused increased attention to be focused on the design, construction, and management of these areas. Land in the vicinity of most dredging projects is now at a premium and without proper management will not be available for future use. Consequently, disposal sites would have to be moved further inland or away from the dredging operation, which would increase the cost of dredging and magnify the adverse environmental impact by requiring more land use. Recognizing the severity of the problem, Congress enacted Public Law 94-587 in which Section 148 required that the Corps of Engineers utilize and encourage the utilization of management practices to extend the capacity and useful life of disposal areas.

2. Improving conditions within containment areas and creating habitats is highly dependent on the availability of equipment that could operate in and about the areas. The establishment of a data base and preparation of a vehicle catalog, the selection of vehicles from this catalog for testing, and the development of equipment-soil relations based on this testing were logical steps in the solution of one of the major problems related to the maintenance and construction of dredged material containment areas, that of selecting available equipment.

Equipment Catalog

3. A limited field data-collection program was conducted to determine the magnitude of the stress level that the environment of dredged material containment areas might produce on ground-crawling equipment (tracked, wheeled, or unconventional) operating in these areas. Five dredged material containment areas were selected that offered a range in operational difficulty.



4. Criteria for selection were primarily type and consistency of the dredged material. Five disposal areas were chosen for study: Blakeley Island, Pinto Island, and McDuffie Island in the Mobile District (MDO); Barnwell Island in the Savannah District; and Craney Island in the Norfolk District. Conditions at each site were characterized to describe the area for mobility purposes using the cone index/rating cone index system, which has been used for many years in predicting soil trafficability for military purposes.

5. The soils data revealed that the operational environment of confined dredged material disposal areas can be highly variable within a given site in terms of material, profile of strength, presence of surface and subsurface water, and vegetal cover. These factors combine to present a very harsh operational environment for vehicles or equipment.

6. A literature search, personal contact with manufacturers, and the expected operational environments established the limits of the vehicle inventory: soft soil was dominant in the areas and thus vehicles would be required with low ground pressures, some payload or earthmoving ability, and capability of operating on very soft soils without immobilizing. A vehicle catalog was compiled that included commercially available vehicles and some standard and experimental military vehicles that had the potential for operating in dredged material environments. The catalog, which formed the first of a series of reports,<sup>1</sup> is included here as Appendix A.

#### Performance Predictions

7. Because the data base collected in the first-phase study did not cover a wide geographical area and the vehicle selection was seemingly so large, soil conditions at additional disposal sites throughout the United States were determined and 18 of the more promising vehicles, covering a range of weights, sizes, propulsional systems, and capabilities, were selected from the equipment catalog for more detailed study. Soils data were collected from dredged material containment facilities near Detroit, Michigan; Chicago, Illinois; New Orleans,

Louisiana; Seattle, Washington; Philadelphia, Pennsylvania; and the Galveston-Houston-Corpus Christi area, Texas; additional data were acquired from the Upper Polecat Bay (UPB) Disposal Area on Blakeley Island, Mobile, Alabama.

8. Predictions were made for the 18 vehicles performing specific tasks analogous to operations in dredged material containment areas. Two towed implements were fabricated for use by those vehicles that did not possess any on-board trenching or ditching capabilities but could negotiate the soft soils rather well, thereby improving their versatility in dredged material containment area operations. In addition to vehicle evaluations, towing force requirements were predicted for the two towed auxiliary trenching implements in combination with the vehicles. Vehicle performance predictions, based on modification of the military mobility relations, were included in the report of the second phase of the series of three studies.<sup>2</sup>

#### Assessment of Vehicles

9. In FY 1976, a full-scale containment area dewatering test and evaluation program was begun at the UPB Disposal Area. The program was a cooperative effort between the Dredged Material Research Program (DMRP) and the MDO and was designed to field test the more promising dewatering methods identified by previous DMRP laboratory studies and to determine the validity of the earlier performance predictions for both individual vehicles and for vehicles towing auxiliary trenching equipment. These field-assessment tests, the third in the series of three studies of the use of low-ground-pressure vehicles in the operation and maintenance of containment areas, were reported in Reference 3 and were the basis of the guidelines presented in this report.



## PURPOSE AND SCOPE

10. Most of the procedures related to construction, maintenance, and management of dredged material containment areas (e.g., area reconnaissance, dike construction, survey, perimeter ditching, trenching, and vegetation planting and maintenance) require vehicles or equipment to accomplish the required task. The vehicles range from small support vehicles to heavy equipment capable of moving large quantities of soil at low cost - all of which must operate on soft soils without immobilizing. Proper management of containment areas include, among other things, selection of equipment that can operate in the environment predicted to exist at the time a particular task must be performed. Guidance is provided for the selection of equipment.

11. Guidelines are given herein for the characterization of the disposal area and the vehicle. Based on these characterizations, a particular piece of equipment can be selected for given working conditions or the limiting soil strength can be determined for a specific piece of equipment. Examples of the use of the selection methodology for a disposal area for fine-grained material are also presented.

## CAUTION

12. The guidance provided herein is based on analytical procedures developed for military vehicles and modified to account for unique conditions associated with containment areas. It is believed that the guidelines can be used with a high degree of confidence if applied properly. However, since the guidelines were refined based on generalized data from field tests primarily conducted in the Mobile, Alabama, area, some caution must be used. As with any basically new methodology, additional refinement based on field experience will be required.

## DEFINITIONS

13. Certain special terms used in this report are defined below:

- a. Coarse-grained soil. A soil with more than 50 percent of the grains by weight, retained on a No. 200 sieve (0.74 mm).
- b. Cone index (CI). An index of the shearing resistance of a medium obtained with a cone penetrometer. The value obtained represents the vertical resistance of the medium to penetration at 6 ft/min\* of a 30-deg cone of 0.5-in.<sup>2</sup> base or projected area. The value, although usually considered dimensionless, actually denotes pounds of force on the handle divided by the area of the cone base in square inches (i.e., pounds per square inch).
- c. Critical layer. The layer of soil that is pertinent to establishing relations between soil strength and vehicle performance. For multiple-pass (50-pass) performance in fine-grained soils and poorly drained sands with fines, it is usually the 6- to 12-in. layer; however, it varies with weight and type of vehicle and with soil strength profile. In this report, critical layer refers to the weaker 6- to 12-in. layer.
- d. Drawbar pull. The amount of sustained towing force a self-propelled vehicle can produce at its drawbar under given test conditions.
- e. Fine-grained soil. A soil with more than 50 percent of the grains, by weight, passing a No. 200 sieve (i.e., smaller than 0.74 mm in diameter).
- f. Mobility index (MI). A dimensionless number used to estimate the vehicle cone index, which results from a consideration of certain vehicle characteristics.
- g. Rating cone index (RCI). The product of the remolding index and the average of the measured in situ cone index for the same layer of soil. The index is valid only for fine-grained soils and poorly drained sands with fines.
- h. Remolding index (RI). A ratio that expresses the proportion of original strength of a medium that will be retained after traffic of a moving vehicle. The ratio is determined from CI measurements made before and after remolding a 6-in.-long sample using special apparatus.

---

\* A table of factors for converting U. S. customary units of measurement to metric (SI) units is presented on page 4.

- i. Vehicle cone index (VCI). The minimum soil strength in the critical soil layer in terms of RCI for fine-grained soils and CI for coarse-grained soils required for a number of passes of a vehicle, usually 1 or 50 passes. As the values of VCI decrease, the go-no go performance capability of a vehicle increases.
- j. VCI<sub>1</sub>. Experimentally determined minimum CI or RCI of the critical layer required for a vehicle to complete one pass. The one-pass critical layer for most vehicles is usually the 0- to 6-in. layer.
- k. VCI<sub>50</sub>. Experimentally determined minimum RCI of the critical layer required for a vehicle to complete 50 passes in a fine-grained soil. VCI<sub>50</sub> is computed for a given vehicle by first calculating an MI from selected vehicle characteristics and then converting the MI to VCI<sub>50</sub> by means of a curve or table.



GUIDELINES FOR SELECTING EQUIPMENT FOR USE IN CONSTRUCTION, OPERATION,  
AND MAINTENANCE OF DISPOSAL AREAS

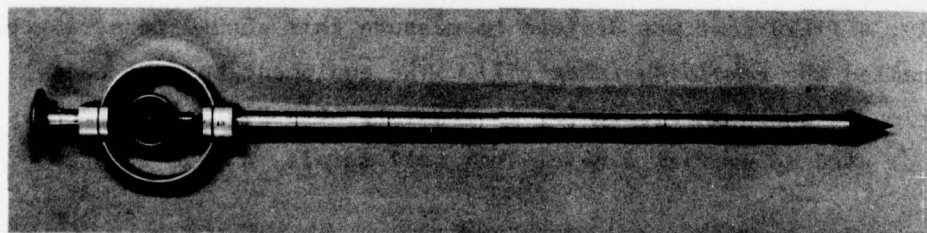
Site Characterization

14. Most containment areas are extremely nonhomogeneous, and careful characterization of a site must be made. Particular care must be taken to determine the location of low-strength zones or the soft spots, since these are the obvious trouble areas. A decision must be made whether to select a vehicle that can operate anywhere within the area (including the soft spots) or to select equipment that can operate in the firmer areas while carefully avoiding the soft spots. The problem is compounded when equipment must be procured prior to filling the area and careful characterization cannot be made. This aspect will be discussed in paragraph 18.

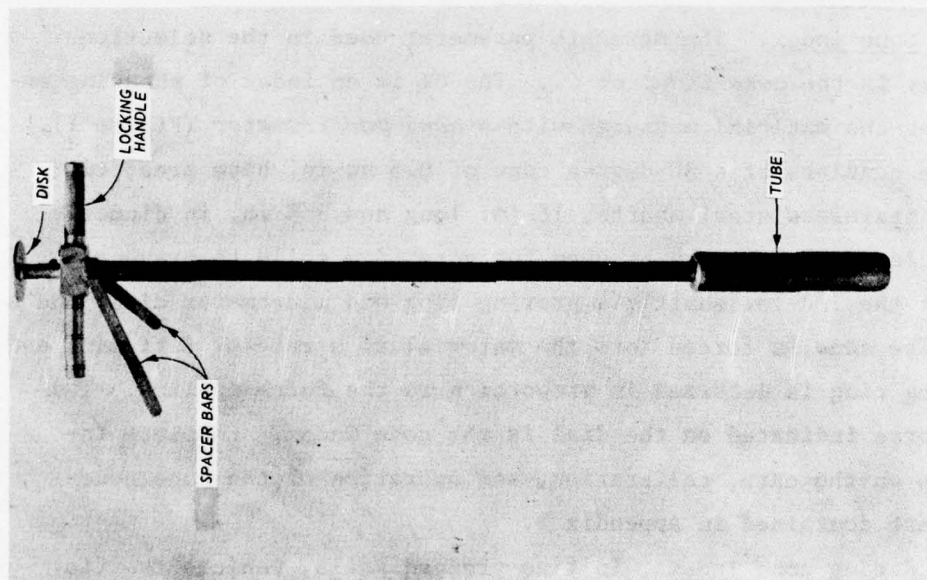
Strength measurements

15. Cone index. The strength parameter used in the selection methodology is the *cone index* or *CI*. The CI is an index of shearing resistance of the material measured with a *cone penetrometer* (Figure 1). The device consists of a 30-degree cone of 0.5 sq in. base area; two connected stainless steel shafts, 18-in. long and 3/8 in. in diameter (5/8-in.-diameter shaft may be used for very firm soils to prevent bending of the 3/8-in. shaft); a proving ring and micrometer dial; and a handle. The cone is forced into the material at a rate of 6 ft/min, and the proving ring is deformed in proportion to the force applied. The applied force indicated on the dial is the cone index. Complete instructions on the care, calibration, and operation of the cone penetrometer are contained in Appendix B.

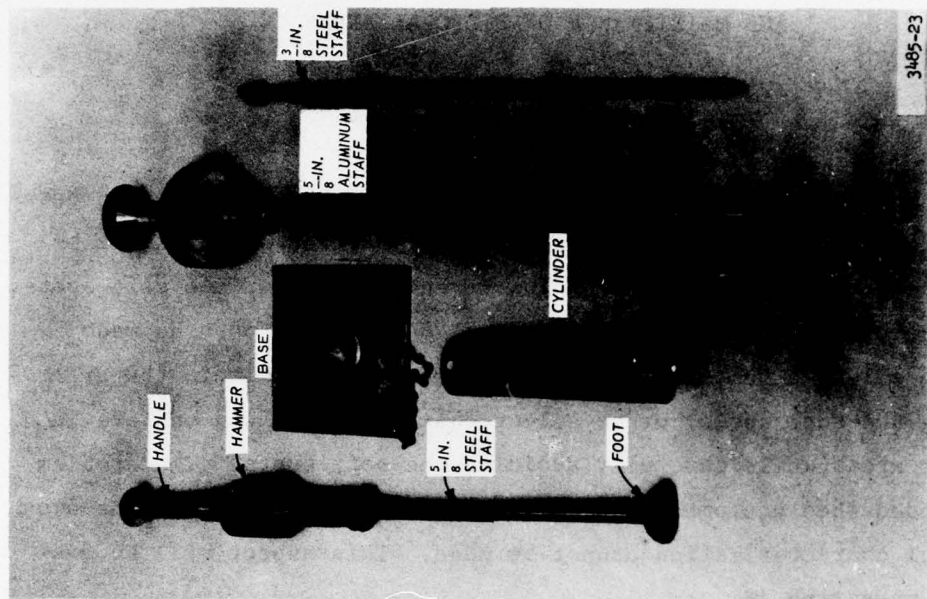
16. Rating cone index. In fine-grained soils, vehicle traffic remolds the underlying soil and thereby causes a change in its strength. Accordingly, a field test was devised to measure this change in strength, which is called the *remolding index* (*RI*). The equipment to make this determination is shown in Figure 1. It consists of a Hvorslev piston-type sampler used to extract a 6-in.-long soil sample, a mold the same



a. CONE PENETROMETER



b. HVORSLEV SOIL SAMPLER



c. REMOLDING TEST EQUIPMENT

Figure 1. Soils testing equipment



size as the sampler tube, and a 2-1/2-lb drop hammer. Procedures for care and use of the equipment are described in Appendix B.

17. A data sheet suggested for recording the CI and RI of a sample site is shown in Figure 2, and sets of hypothetical data to illustrate proper testing and recording procedures are shown in Figure 3. As previously stated, sample sites should be spaced throughout the containment area and carefully selected to characterize the entire area. The following steps should be followed to ensure proper characterization.

- Step 1. Ten sets of data should be collected at each sampling site (within a circle of about 20-ft diameter) and the average CI at each depth determined as illustrated in Figure 3.
- Step 2. Determine the average CI for each 6-in. increment and record as shown in Figure 3.
- Step 3. For fine-grained soils, a 6-in.-long soil sample from the 0- to 6-in. and 6- to 12-in. depth intervals should be obtained with the Hvorslev sampler from the sample site. The strength of the soil usually decreases with depth in a containment area, and generally the 12- to 18-in. layer has about the same characteristics as the 6- to 12-in. layer. Also vehicles that would sink more than 12 in. would usually be immobilized in dredged material containment areas. Therefore, unless individual areal conditions or equipment specifications merit further investigation, remolding tests can usually be omitted for material below 12 in.
- Step 4. The 6-in.-long sample is placed in the remolding cylinder as described in Appendix B.
- Step 5. The CI of the sample in the tube is determined for the top 4 in. of the soil and is recorded and indicated on Figure 3 as "before" cone index.
- Step 6. The sample is subjected to 100 blows from the hammer.
- Step 7. The CI is determined for the upper 4 in. of the remolded sample and recorded as "after" as shown in Figure 3.
- Step 8. Totals are obtained for the "before" and "after" and the "after" is divided by the "before" to obtain the *remolding index (RI)*. A minimum of two tests are

# CONE INDEX DATA SHEET

LOCATION \_\_\_\_\_  
 AREA \_\_\_\_\_ DATE \_\_\_\_\_  
 CONE \_\_\_\_\_ SHAFT \_\_\_\_\_ DIAL \_\_\_\_\_

## CONE INDEX AT DEPTHS, IN.

DEPTH STATION	SURFACE	1	2	3	4	5	6	9	12	15	18	24	30	36
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
TOTAL														
AVERAGE														

## REMODELING INDEX

LAYER		0-6 IN.						6-12 IN.						12-18 IN.					
DEPTH	TEST	1		2		3		1		2		3		1		2		3	
	NO. BLOWS	BEF	AFT	BEF	AFT	BEF	AFT	BEF	AFT	BEF	AFT	BEF	AFT	BEF	AFT	BEF	AFT	BEF	AFT
	SURFACE																		
1																			
2																			
3																			
4																			
TOTAL																			
RI																			

## AVERAGES, IN.

LAYER	0-6	6-12	12-18
CI			
RI			
RCI			

CRITICAL LAYER RCI \_\_\_\_\_

Figure 2. Cone Index Data Sheet

# CONE INDEX DATA SHEET

LOCATION \_\_\_\_\_  
 AREA \_\_\_\_\_ DATE \_\_\_\_\_  
 CONE \_\_\_\_\_ SHAFT \_\_\_\_\_ DIAL \_\_\_\_\_

## CONE INDEX AT DEPTHS, IN.

DEPTH STATION	SURFACE	1	2	3	4	5	6	9	12	15	18	24	30	36
1	47	51	46	35	27	25	22	12	11	10	9	8	8	6
2	27	23	17	13	12	11	11	9	9	8	8	8	8	7
3	35	43	38	34	28	21	20	16	15	14	13	8	7	6
4	30	32	27	30	28	24	19	16	16	14	13	9	6	6
5	37	34	26	24	21	19	16	14	14	12	10	9	8	8
6	29	36	31	27	22	17	13	10	10	9	8	7	7	6
7	40	35	32	25	19	16	12	10	10	10	8	8	8	8
8	29	26	23	21	18	15	13	13	13	11	10	9	8	8
9	23	19	17	16	14	13	12	10	10	9	9	9	8	8
10	26	31	29	24	21	18	14	12	11	9	9	8	7	7
TOTAL	323	330	286	249	210	179	152	122	119	106	97	83	75	70
AVERAGE	32	33	29	25	21	18	15	12	12	11	10	8	8	7

## REMOLDING INDEX

LAYER		0-6 IN.						6-12 IN.						12-18 IN.					
TEST		1		2		3		1		2		3		1		2		3	
NO. BLOWS		BEF 0	AFT 100	BEF 0	AFT 100	BEF 0	AFT 100	BEF 0	AFT 100	BEF 0	AFT 100	BEF 0	AFT 100	BEF 0	AFT 100	BEF 0	AFT 100	BEF 0	AFT 100
DEPTH																			
SURFACE		38	35	28	19			12	6	24	18								
1		40	25	27	22			11	6	19	13								
2		30	20	23	18			11	9	13	11								
3		25	15	19	13			11	9	10	9								
4		20	15	17	10			9	9	10	8								
TOTAL		153	110	114	82			54	39	76	59								
RI		0.72		0.72				0.72		0.78									

## AVERAGES, IN.

LAYER	0-6	6-12	12-18
CI	25	13	11
RI	0.72	0.75	
RCI	18	10	

CRITICAL LAYER RCI 10

Figure 3. Cone Index Data



conducted per 6-in. soil layer; unless the two values check within 0.1, a third test must be conducted. The three tests are either averaged or the "outlier" is discarded, and the two closer values are averaged.

Step 9. The averages of the CI values for the 0- to 6-in. and the 6- to 12-in. layers are multiplied by the respective RI's to obtain strength values called the *rating cone index* or RCI and recorded as shown. For coarse-grained material, which usually exhibits no strength loss with traffic, remolding tests are not conducted and the CI is the parameter used to estimate vehicle performance.

18. Soil strength assumptions. If the equipment is to be obtained prior to filling the area, assumptions must be made with regard to expected soil strengths. Immediately after filling the containment area, the RCI for fine-grained material is essentially zero. The strength will gradually increase with time as a function of climatic conditions and management techniques, but unless the disposal area has been subject to extremely high evaporative rates or the soil was mixed with coarse-grained material (which would increase the drying rate), the RCI of the critical layer must be considered less than about 4 in selecting a vehicle for operations. This value represents the minimum critical layer RCI on which a man can walk without extreme difficulty and is about the maximum critical layer value to be expected over a short period of time in fine-grained soils in which no dewatering techniques have been applied.

Critical layer

19. The RCI values of the 0- to 6-in. layer and the 6- to 12-in. layer in most instances represent the soil strength value empirically found to most nearly reflect vehicle performance in soft soils and are used as a basis for this methodology. The vehicle is selected based on the RCI value in the critical layer: the critical layer is defined as that 6-in. soil increment with the lower RCI value. For the example shown in Figure 3, the critical layer would be the 6- to 12-in. layer.

### Vehicle Characterization

20. For the methodology described herein, the selection of a vehicle is governed by the *vehicle ground contact pressure* or VGCP. The VGCP for tracked and wheeled vehicles can be determined from the following equations:

Tracked vehicle:

$$\text{VGCP} = \frac{\text{Gross weight, lb}}{\text{Area of tracks in contact with ground, sq in.}} \quad (1)$$

Wheeled vehicle:

$$\text{VGCP} = \frac{\text{Gross weight, lb}}{\text{Tire width, in.} \times \frac{\text{Outside diam of tire, in.}}{2} \times \text{no. of tires}} \quad (2)$$

21. Tracked draglines are frequently operated from work platforms made of wooden mats. When the mats are placed in a double layer with one row atop the other and at right angles to each other, the work platform is relatively stable, and the ground contact pressure of the dragline is considered to be distributed evenly over the surface area of the mats. Bouyancy effects (flotation potential) are assumed to counteract with weight of the mats. The ground pressure of the dragline on a single layer of mats is difficult to assess because of the movement of the mats during vehicle passage. The single mats obviously produce a ground pressure between that of the dragline with no mats and that of the dragline mounted on the double mat platform. From manufacturers' literature, it was assumed that the single mats would reduce the ground pressure difference about 75 percent.\* The VGCP for mat-mounted tracked vehicles can be estimated as follows:

Tracked vehicles on mats:

$$\text{VGCP}_{\text{double mats}} = \frac{\text{Gross vehicle weight, lb}}{\text{Surface area of mats, in.}^2} \quad (3)$$

$$\text{VGCP}_{\text{single mats}} = \text{VGCP}_{\text{no mats}} - 0.75(\text{VGCP}_{\text{no mats}} - \text{VGCP}_{\text{double mats}}) \quad (4)$$

---

\* The validity of this assumption could not be fully determined from the tests performed and would require additional data for validation.



## Vehicle Selection

### Mobility

22. The curves shown in Figure 4 may be used to determine if a particular piece of equipment can operate in a given area. The one-pass criterion curve is used for selection of equipment for reconnaissance or survey where the vehicle is to be used for transporting personnel or equipment and is not intended to perform additional work or to operate again in its original tracks. The multi-pass criterion curve should be used for equipment such as bulldozers, draglines, etc., that must work within the containment areas or for survey or reconnaissance vehicles that make repeated passes within their own tracks.

23. In selecting a vehicle for operating in a given areas, the limiting soil strength (RCI) of the critical layer must be assumed as discussed in paragraph 18 or determined by on-site data collection. The RCI obtained is then used to enter Figure 4 to select the maximum vehicle ground contact pressures; vehicles with VGCP values less than the value obtained from Figure 4 should be able to operate in the area for either one-pass operations or multiple-pass operations (depending on which curve was used). Caution should be exercised when selecting a vehicle whose ground contact pressure just equals that obtained from Figure 4 at the RCI required to allow for undetected soft spots in the area or for possible errors in vehicle operation that could cause immobilization. A factor of safety is built into the curves, but because of the high probability of undetected soft spots within an area, borderline cases should be carefully considered.

### Drawbar pull

24. The amount of drawbar pull a particular vehicle can provide can be determined from Figure 5 for tracked vehicles and from Figure 6 for wheeled vehicles. The following information must be known: the gross weight of the vehicle and the *excess rating cone index* or  $RCI_x$ . The  $RCI_x$  is determined by subtracting the required RCI for a particular vehicle to operate under the one-pass or multiple-pass criteria from the RCI measured within the containment area. For example, if the VGCP for

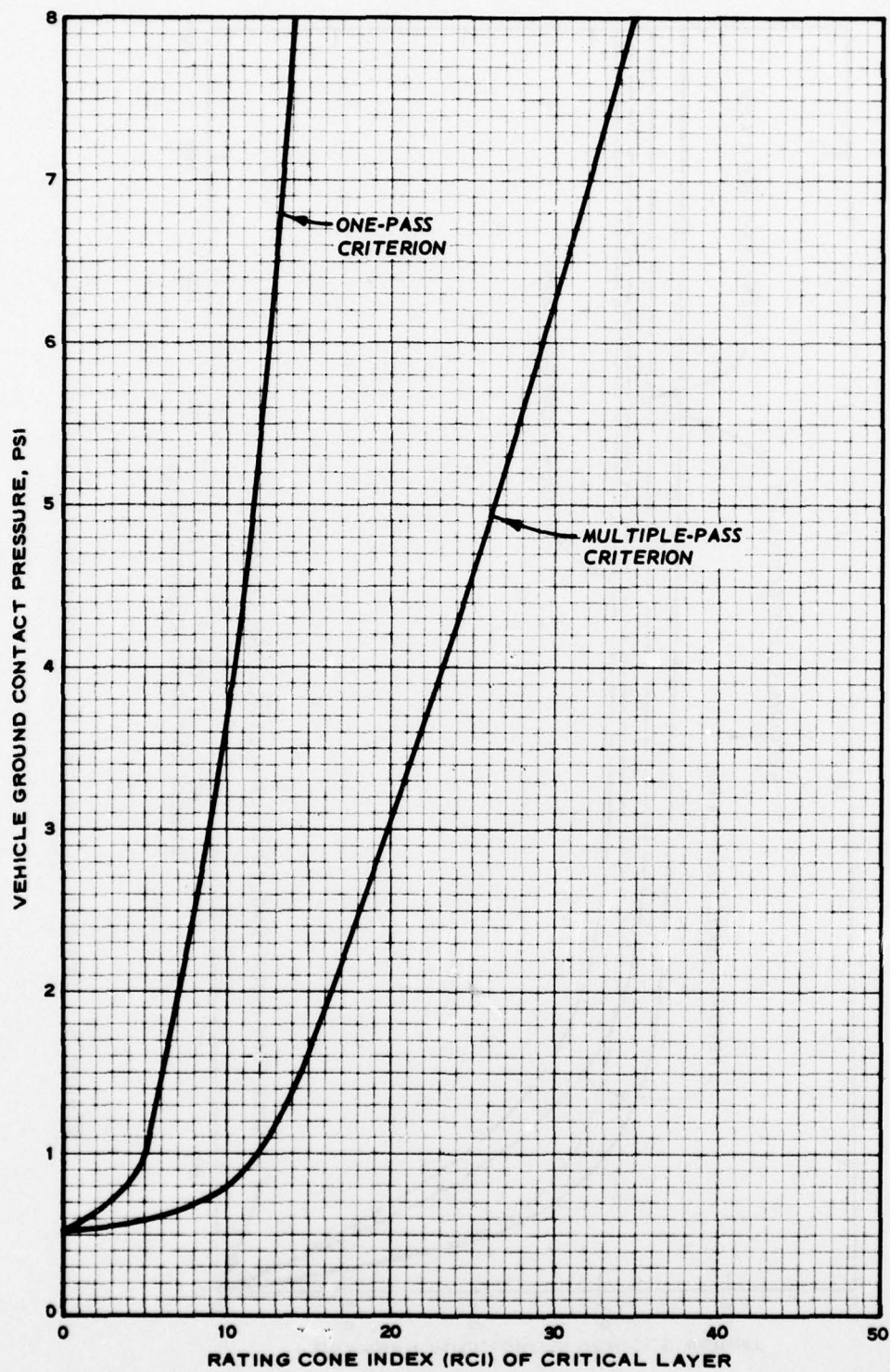


Figure 4. Vehicle ground pressure versus rating cone index of critical layer

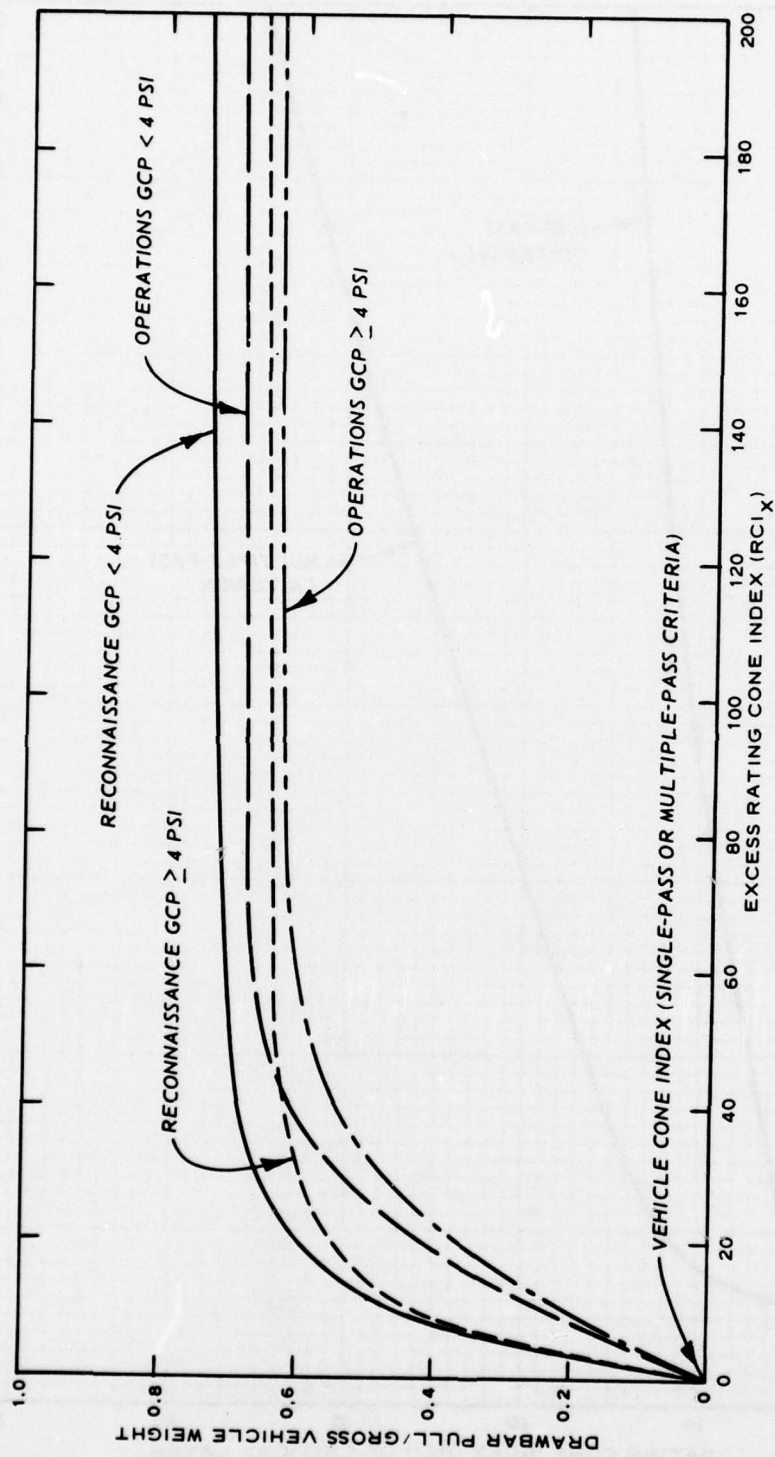


Figure 5. Drawbar pull versus soil strength for tracked vehicles



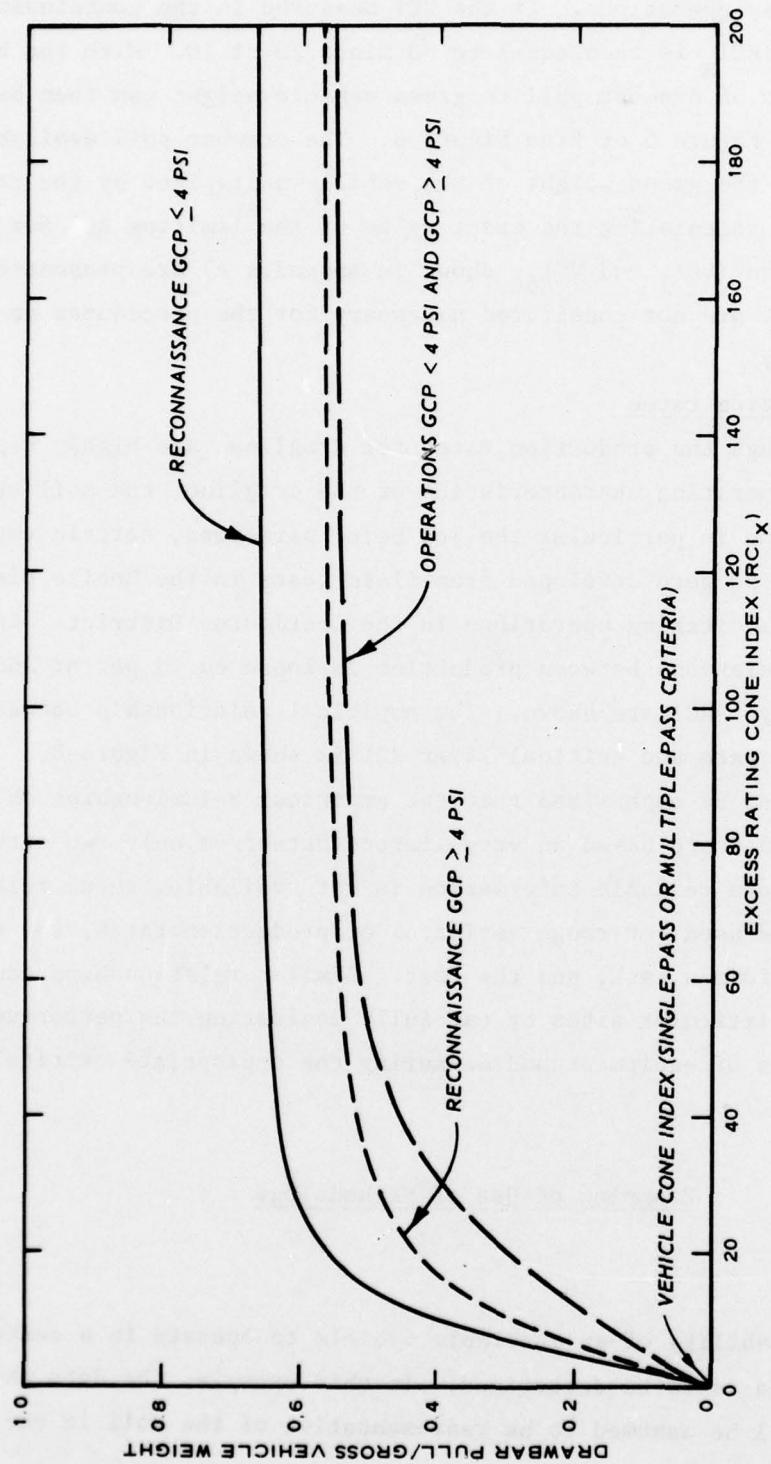


Figure 6. Drawbar pull versus soil strength for wheeled vehicles

a particular vehicle is 3 psi, from Figure 4, an RCI of 20 is required for multiple-pass operations. If the RCI measured in the containment area is 30, the  $RCI_x$  is then equal to 30 minus 20 or 10. With the  $RCI_x$  known, the ratio of drawbar pull to gross vehicle weight can then be determined from Figure 5 or from Figure 6. The drawbar pull available will then equal the gross weight of the vehicle multiplied by the ratio. (Procedures for calculating the exact value of the limiting RCI for vehicle operation ( $VCI_1$  and  $VCI_{50}$  shown in Appendix A) are presented in Reference 2, but are not considered necessary for the procedures described herein.)

#### Dragline production rates

25. Although the production rates for draglines are highly dependent upon the operating characteristics of the dragline, the soil type and strength, and in particular the job being performed, certain empirical relationships were developed from field tests in the Mobile District and actual ditching operations in the Charleston District. In Figure 7, the relations between production in loose cu yd per hr and the critical-layer RCI are shown. The empirical relationship between linear ditching rate and critical layer RCI is shown in Figure 8.

26. It must be emphasized that the empirical relationships shown in Figures 7 and 8 are based on very limited data from only two sites. However, when more reliable information is not available, these relationships may be used for rough estimates of production rates, the time required to perform a task, and the cost. Similar relationships can be developed for particular sites by carefully monitoring the performance of various types of equipment and measuring the appropriate critical layer RCI's.

#### Examples of Use of Methodology

##### Example 1

27. The ability of an available vehicle to operate in a certain containment area is to be determined. In this example, the data shown in Figure 3 will be assumed to be representative of the soil in the containment area.

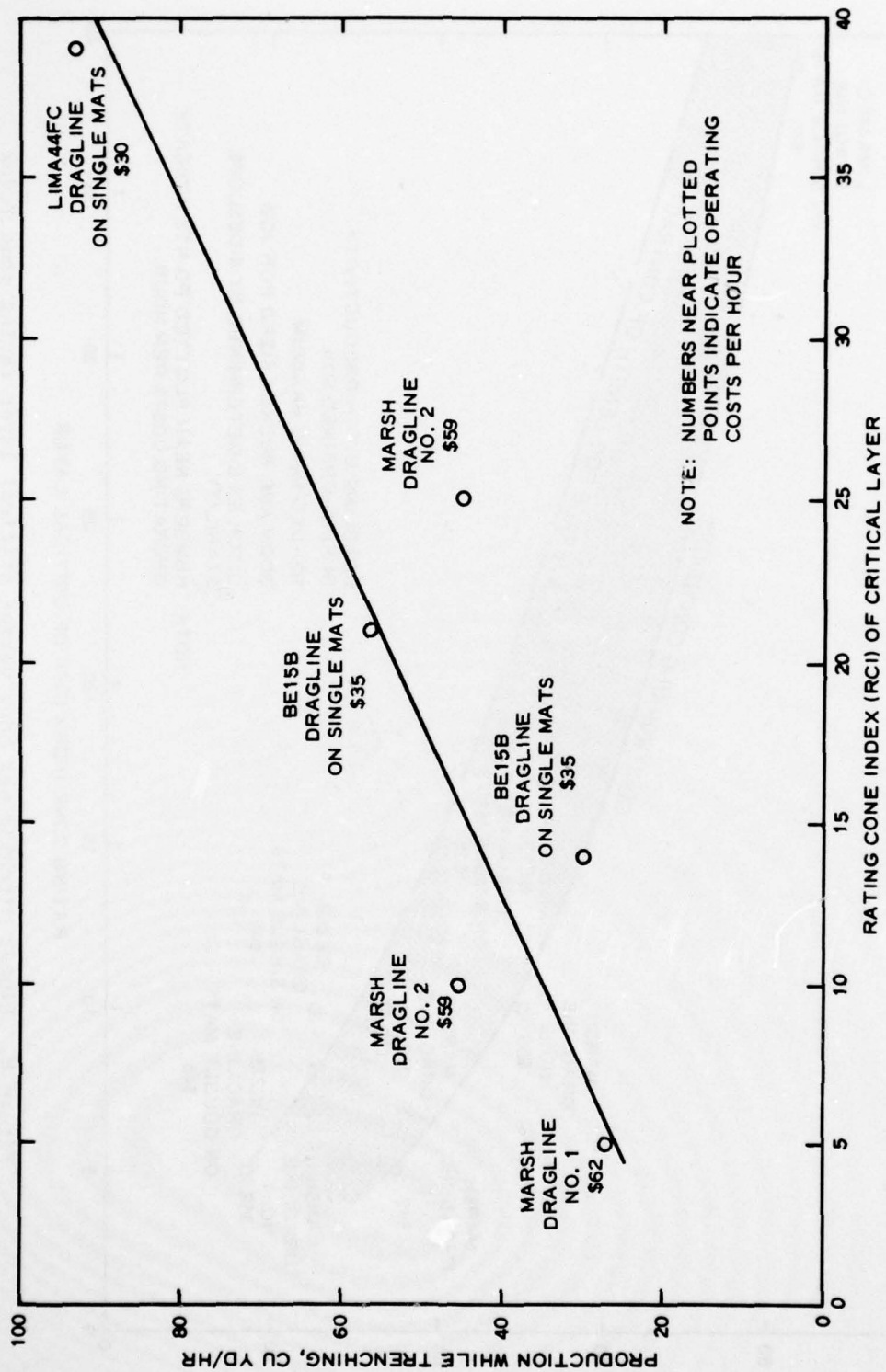


Figure 7. Dragline production versus critical layer rating cone index



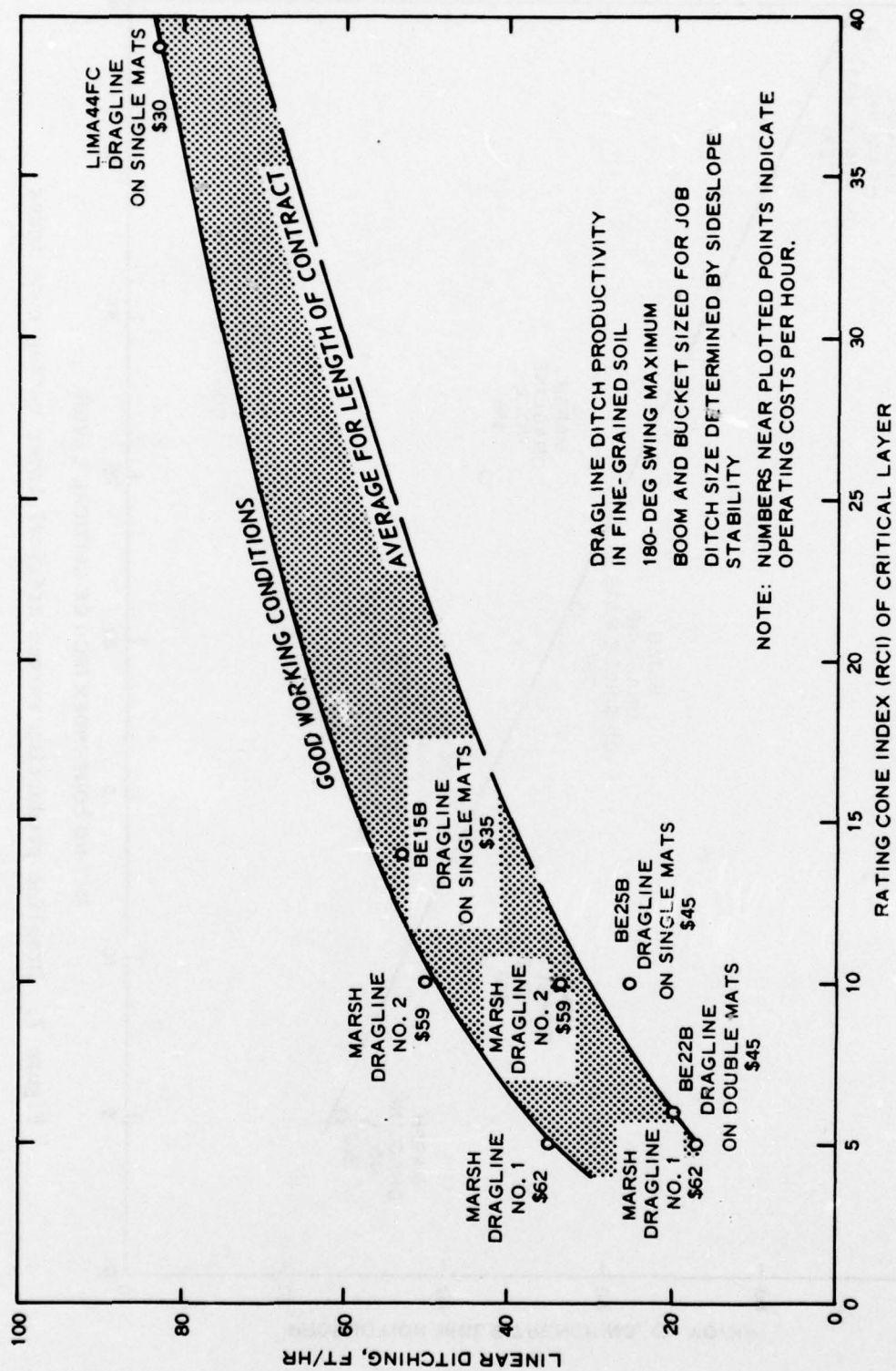


Figure 8. Linear ditching per hour versus critical layer rating cone index

- Step 1. Determine the RCI of the critical layer. From Figure 3, the RCI is 10.
- Step 2. Determine the maximum allowable VGCP for a vehicle to operate in the containment area. Enter Figure 4 at RCI = 10 and read the VGCP intercept points for each criterion: 3.6 psi for one-pass operations and 0.8 psi for multiple-pass operations (see Figure 9)
- Step 3. Establish the characteristics of the vehicle being considered for use in the containment area. The following characteristics were assumed:

Gross weight, lb	7000
Track width, in.	28
Track length in contact with ground surface, in.	75
Number of tracks	2

- Step 4. Substitute the vehicle characteristics into EQ 1 and obtain the VGCP.

$$\begin{aligned}
 \text{VGCP} &= \frac{\text{Gross weight, lb}}{\text{Area of tracks in contact with ground, sq in.}} & (1) \\
 &= \frac{7000}{28 \times 75 \times 2} \text{ or } 1.67 \text{ psi}
 \end{aligned}$$

- Step 5. Evaluate the vehicle. The allowable VGCP for one-pass operations is 3.6 psi and for multiple-pass operations is 0.8 psi; the VGCP of the vehicle is 1.67 psi. Therefore, the vehicle could be used only for such purposes as surveying and reconnaissance, or it could be used for one-pass ditching using towed auxiliary trenching equipment if the vehicle develops sufficient drawbar pull. The drawbar pull of the vehicle is determined by the following computations.
- Step 6. Determine the allowable RCI for the vehicle. From Step 4, the VGCP is 1.67. Enter Figure 4 at 1.67 and read the RCI intercept for the one-pass criterion, which is 6.5
- Step 7. Determine the  $\text{RCI}_x$ . The  $\text{RCI}_x$  is determined by subtracting the critical layer RCI required for a particular vehicle to operate under the one-pass or multiple-pass criterion from the RCI measured within the containment area (Figure 4). For the stated conditions:

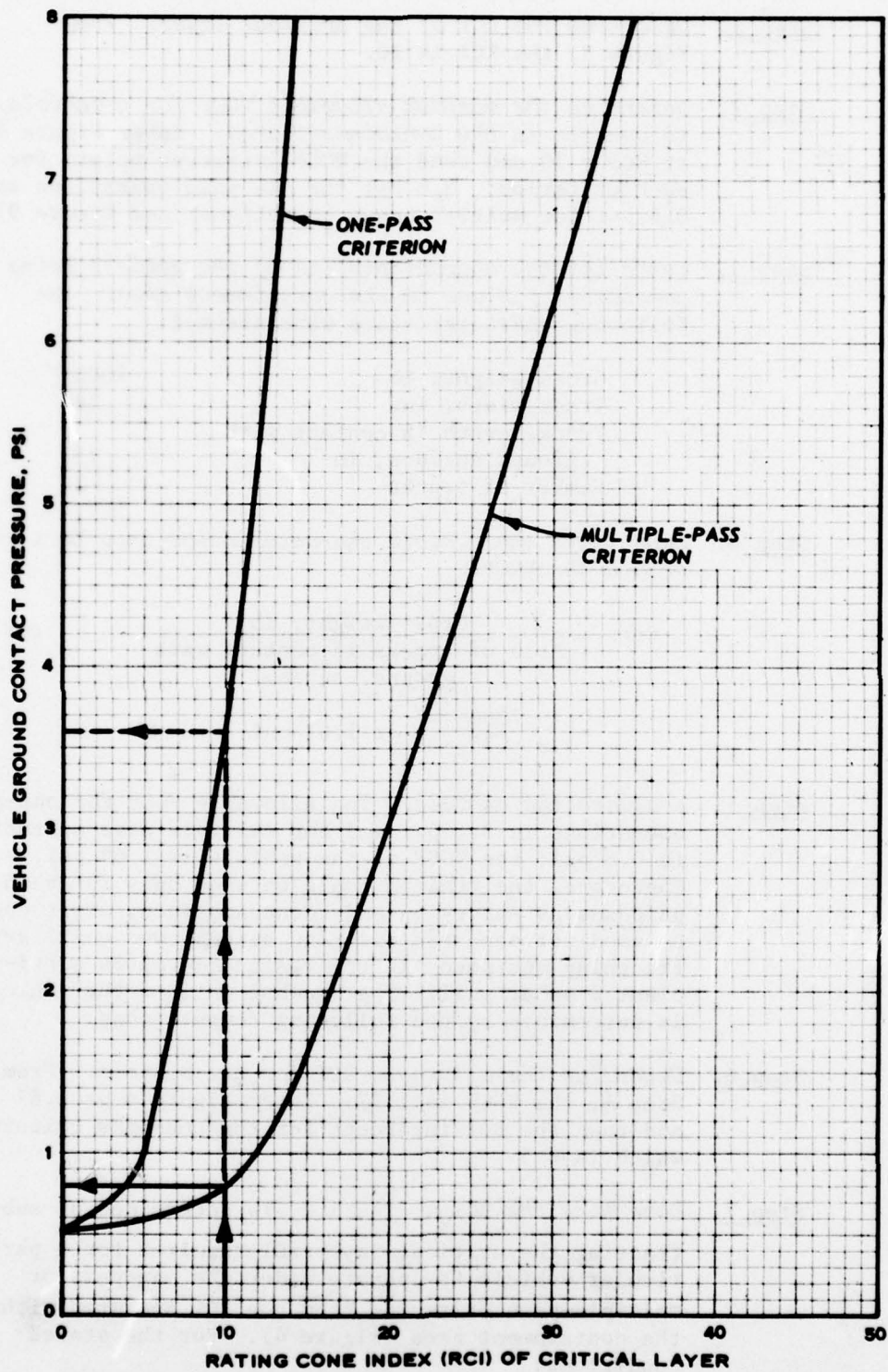


Figure 9. Example of determination of VGCP for a vehicle to operate in a particular containment area



$$RCI_x = 10 - 6.5 \text{ or } 3.5$$

Step 8. *Determine the drawbar pull/gross vehicle weight ratio.* Entering Figure 5 for tracked vehicle and reconnaissance vehicles with VGCP less than 4 psi, the drawbar pull/gross vehicle weight ratio for an  $RCI_x$  of 3.5 is determined to be approximately 0.16.

Step 9. *Compute the available drawbar pull of the vehicle.* Substitute in the following equation (reference paragraph 24):

$$\text{Drawbar pull} = \left( \frac{\text{drawbar pull}}{\text{gross vehicle weight}} \right) \times \text{gross vehicle weight}$$

$$= 0.16 \times 7000 \text{ or } 1120 \text{ lb}$$

Step 10. *Evaluate the vehicle.* The preceding calculations indicate that the vehicle has sufficient drawbar pull to tow relatively small equipment.

28. The vehicle being evaluated could not be used to perform tasks that require multiple passes of the vehicle in approximately the same path (for example, excavating soil or grading). Since the vehicle cannot perform production work, no estimate of production rate or cost is appropriate.

#### Example 2

29. An example of a tracked dragline being considered for ditching operations in a disposal area is presented to illustrate the use of the multiple-pass criterion, as well as the production rate and cost curves shown in Figures 7 and 8, respectively.

Step 1. *Determine the RCI of the critical layer.* The critical layer is assumed to be 6 to 12 in. with an RCI of 15.

Step 2. *Establish the characteristics of the dragline.* The following characteristics were assumed:

Gross weight, lb	32,000
Track width, in.	20
Track length in contact with ground surface, in.	120
Number of tracks	2

Step 3. *Substitute the vehicle characteristics into Eq 1 and obtain the VGCP.*

$$\begin{aligned} \text{VGCP} &= \frac{\text{Gross weight, lb}}{\text{Area of tracks in contact with ground, sq in.}} & (1) \\ &= \frac{32,000}{20 \times 129 \times 2} \text{ or } 6.20 \text{ psi} \end{aligned}$$

Step 4. *Determine the minimum RCI required for the dragline to operate in the containment area. Enter Figure 4 at VGCP = 6.20 psi and read the RCI intercept for the multiple-pass criterion curve, which would be 30 RCI.*

Step 5. *Evaluate the dragline. Since the RCI required for operation of the dragline is 30 and the RCI of the critical layer was assumed to be 15, the dragline cannot work in the area without mats or other means to lower the ground contact pressure.*

30. The next measure to take would be to determine the required RCI for operation of the dragline on wooden mats. If the mats were placed in a double layer with one row atop the other at right angles to each other, the work platform created would be relatively stable and the ground contact pressure of the mat-mounted dragline would be lower than that of the dragline.

Step 6. *Compute the ground contact area of the work platform. Assuming that the mats are 20-ft long and 5-ft wide (common size used for the 16-ton dragline) and that four mats are required per row under the dragline, then the contact area would be computed as follows:*

$$144(20 \times 5 \times 4) \text{ or } 57,600 \text{ in.}^2$$

Step 7. *Determine the VGCP for the dragline on a double-mat work platform.*

$$\begin{aligned} \text{VGCP}_{\text{double mats}} &= \frac{\text{gross vehicle weight}}{\text{ground contact area of mats}} \\ &= \frac{32,000}{57,600} \text{ or } 0.6 \text{ psi} \end{aligned}$$

Step 8. *Evaluate the dragline of double mats. Entering Figure 4 at VGCP = 0.6 psi and reading the intercept with the multiple-pass criterion curve; the required RCI of the critical layer is found to be 5. Thus, the mat-mounted dragline could work effectively in the disposal area with some margin of safety.*

31. Since the dragline can operate from the double-mat platform, the possibility of operation from a single-mat platform would then be determined.

Step 9. *Determine the VGCP for the dragline on a single-mat work platform.* To account for interaction between mats and edge effects, if only one row of mats is used, it is assumed that the ground contact pressure is effectively lowered to about 75 percent of the difference between no mats and double mats. Therefore for single mats

$$\begin{aligned}\text{VGCP}_{\text{single mat}} &= 6.2 - \{0.75 (6.2-0.6)\} \\ &= 6.2 - (0.75 \times 5.6) \\ &= 6.2 - 4.2 \text{ or } 2.0 \text{ psi}\end{aligned}$$

Step 10. *Evaluate the dragline on single mats.* Enter Figure 4 at VGCP = 2.0 psi and read the intercept with the multiple-pass criterion: the required RCI of the critical layer is 16. Therefore, conditions for operation of the dragline on single mats are marginal with a good possibility of immobilization. Hence, the better alternative would be to use the dragline on double mats or select another vehicle.

32. Assume that it is practical to use the dragline on double mats. Figures 7 and 8 can be used to estimate the production capabilities of the dragline and to estimate the production costs.

Step 11. *Determine the production rate for trenching.* Enter Figure 7 at RCI = 15 and read the intercept for production: the dragline should be able to move about 43 cu yd of material per hour digging sumps, ditching, or performing other soil-moving tasks.

Step 12. *Determine the production rate for linear ditching.* Enter Figure 8 at RCI = 15 and read the intercept for ditching: if the dragline is used to move about inside the disposal area creating ditches for drainage, the range of linear ditches created per hour should be 40 to 58 ft/hr (governed by the side slope of the ditches).



Step 13. *Determine production costs.* Production costs would be computed as follows:

$$\text{cost of operation/hr} \times \frac{\text{cu yd material to be moved}}{\text{production rate of dragline}}$$

$$\text{cost of operation/hr} \times \frac{\text{linear ft of ditches}}{\text{production rate of dragline}}$$

#### Application

33. The data obtained through these procedures can be used for several purposes, including estimation of the length of the contract required or the cost, as well as daily spot checks of vehicle operations to ascertain the efficiency of the contractor. These data were determined from actual on-site operations and should need only minor adjustment for changes in geographical, soil, or climatic conditions other than those for the area used in this study (Mobile and Charleston, summer conditions, clay and silty clay soils).

#### REFERENCES

1. Green, Charles E., and Rula, Adam A., "Low-Ground-Pressure Construction Equipment for Use in Dredged Material Containment Area Operation and Maintenance: Equipment Inventory," Technical Report D-77-1, April 1977, U. S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Mississippi.
2. Willoughby, William E., "Low-Ground-Pressure Construction Equipment for Use in Dredged Material Containment Area Operation and Maintenance: Performance Predictions," Technical Report D-77-7, August 1977, U. S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Mississippi.
3. Willoughby, William E., "Low-Ground-Pressure Construction Equipment for Use in Dredged Material Containment Area Operation and Maintenance: Validation Tests," Technical Report D-77-8 (in press), U. S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Mississippi.

## APPENDIX A: VEHICLE CATALOG

1. The primary purpose of this appendix is to present pertinent vehicle data in catalog form to assist potential vehicle users in the assessment and/or selection of the vehicles to perform jobs relevant to the operation and maintenance of dredged material containment areas.

2. Each vehicle included in the catalog is described by several photographs or drawings; manufacturer's address; general vehicle data, under which performance data can be found; mechanical components data that give dimensions or describe major components of the vehicle, i.e., engine, suspension, etc.; and miscellaneous data, under which cost (1974), primary use, potential use (based on physical size and payload), etc., information is found.

3. The vehicles presented herein were selected from a literature search or personal contact with vehicle manufacturers in the United States and Canada. The vehicle catalog is by no means complete, nor are all the data on the vehicles included complete. Final selection of vehicles was based on 1-pass vehicle cone index (VCI) of 30 or less. This process resulted in the selection of 60 vehicles. To obtain some idea as to the size of job that the vehicle can perform, they were divided into six vehicle groups in terms of payload ranges, as follows:

<u>Vehicle Classification</u>		<u>Number of Vehicles in Group</u>
<u>Group No.</u>	<u>Payload Ranges, tons</u>	
I	>0 - 3/4	19
II	1 - 2-1/2	11
III	3 - 7-1/2	11
IV	8 - 15	8
V	>15	8
VI	0 (Bulldozers)	3
Total		60

4. The WES-VCI submodel was used to compute the minimum soil strength required by a vehicle to complete 1 pass and 50 passes successfully while the vehicle is traveling in a straight-line path in fine-grained soils. These performance levels are identified as  $VCI_1$  and  $VCI_{50}$  in the catalog. The  $VCI_1$  and  $VCI_{50}$  levels are approximately the same as the single- and multiple-pass criteria given in the main text.



The vehicle data given in the catalog were used to compute VCI's. These data may also be used to determine the required critical layer RCI from Figure 4. If the critical layer RCI from Figure 4 is not the same as the VCI shown in the catalog for a particular vehicle, the more conservative value should be used. The VCI data shown for vehicles with helical screw running gear were determined by actual vehicle tests\* and are identified as experimental VCI's.

5. Tests conducted to evaluate the accuracy of predicted VCI's have shown that the computations are very good for wheeled and tracked vehicles operating in fine-grained soils that are not in a viscous state (rating cone index >7). VCI prediction accuracy is also good for tracked vehicles with sealed sponsons that are part of the track system, provided the effects of buoyancy are accounted for in the computations. On the other hand, the VCI prediction accuracy for low-ground-pressure tracked vehicles with open track systems is very low. Experience has shown that an open track operating in viscous soils develops a high motion resistance because the soft soil flows into the track system and interferes with the running gear components. For this reason, when the computed VCI (particularly  $VCI_{50}$ ) is  $\leq 6$  for tracked vehicles with open track systems (vehicles I-3, I-15, I-17, and II-4), these values should be used with caution.

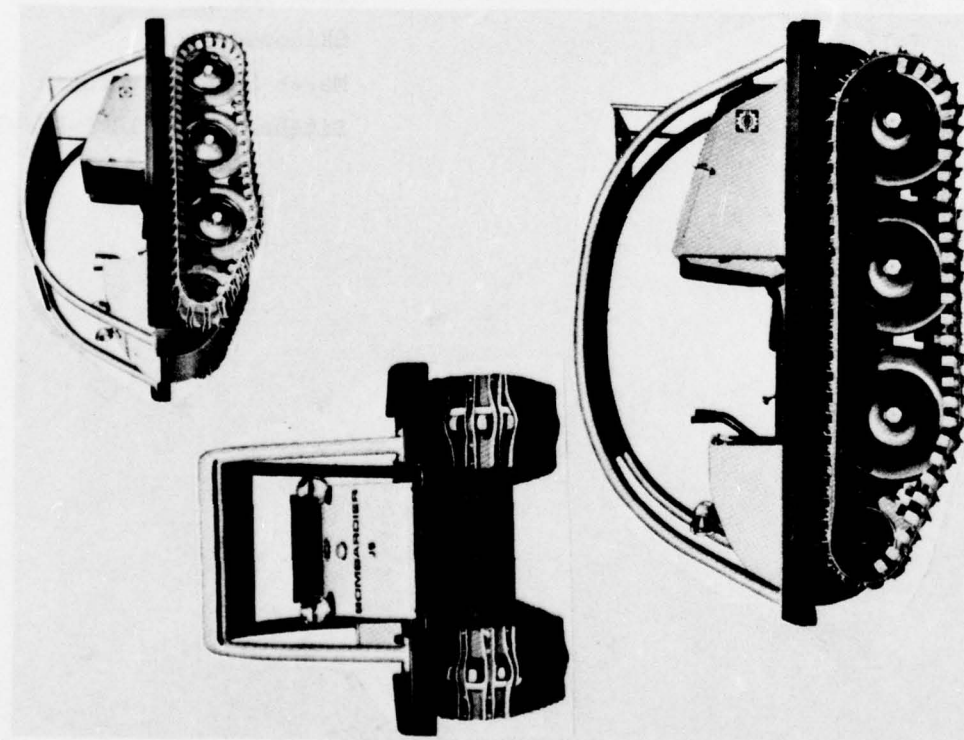
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\* Knight, S. J., Rush, E. S., and Stinson, B. G., "Trafficability Tests with the Marsh Screw Amphibian on Coarse-Grained and Fine-Grained Soils," Technical Report No. 3-641, Jan 1964, U. S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss.

Index of Group I Vehicles, >0- to 3/4-Ton Payload

<u>Vehicle No.</u>	<u>Vehicle Identification</u>
I-1	J-5 Tractor
I-2	SW-48F
I-3	2100-C Trackmaster
I-4	Muskeg Tractor Gas
I-5	Amphicat
I-6	Terra-Jet
I-7	Coot
I-8	Bombi
I-9	The Kidd
I-10	Thiokol Swamp Spryte 1301
I-11	FN 10
I-12	Skidozer 200
I-13	Marsh Cub (Model 104T-LPC-68)
I-14	M29C Weasel
I-15	Skidozer 301-D
I-16	1404 Imp
I-17	Skidozer 301
I-18	Marsh Screw Amphibian
I-19	Ditcher Model 104T-DSP-70

Specifications for Vehicle No. 1-1  
Vehicle Identification: J-5 Tractor



Vehicle Manufacturer: Bombardier Limited  
Industrial Division  
Valcourt, Quebec, Canada

General Data

Weight - Basic:	4126 lb	Maximum Speed - Land:	20 mph
Payload:	374 lb	- Water:	0 mph
Gross Weight:	4500 lb	Ground Clearance:	13 in.
Ground Pressure - Empty:	20.31 psi	Fording Depth:	22 in.
- Loaded:	— psi	Maximum Slope Negotiable:	50 %
Overall - Length:	122-1/4 in.	Vehicle Cone Index (1-Pass):	7
- Width:	64-3/4 in.	Vehicle Cone Index (50-Pass):	17
- Height:	73 in.	Track or Tire Size:	16.5 x 70 in.
Grouser Height:	51.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	4.45 in.		
Number of Roadwheels or Bogies per Side:	3		

Mechanical Components Data

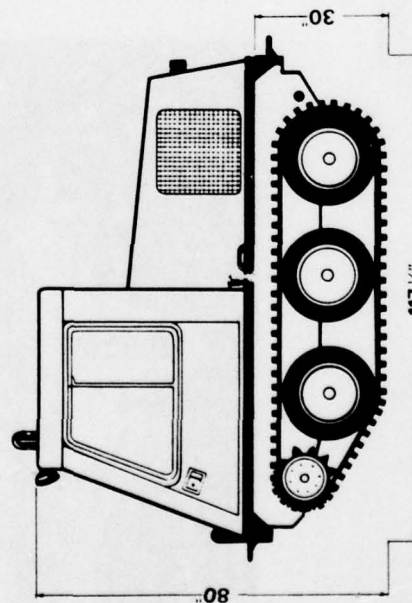
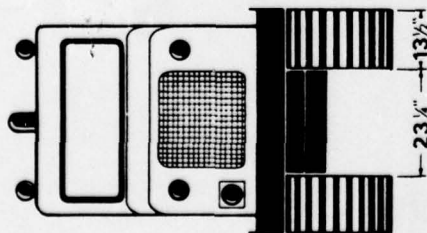
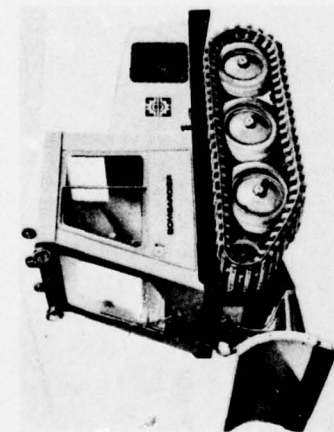
Engine -	Suspension:
Standard: Chrysler, 251 Industrial, 113 BHP	Front wheel on bogie spindle, center and rear wheels on tandem, standard bogie spring.
Optional: None	
Transmission -	Tracks or Wheels:
Main: 4 speed manual	Two 5-1/2-in.-wide endless rubber and fabric belts reinforced with steel wire.
Optional: None	
Auxiliary: None	

Miscellaneous

Primary Use:	Mount for punn blade or pull plow.	Cost:	\$2030
Potential Uses:			
Available:	Yes		



Specifications for Vehicle No. J-2  
Vehicle Identification: SV-48F



A5

Vehicle Manufacturer: Bombardier Limited  
Industrial Division  
Valcourt, Quebec, Canada

#### General Data

Weight - Basic:	1540 lb	Maximum Speed - Land:	22 mph
Payload:	460 lb	- Water:	0 mph
Gross Weight:	5000 lb	Ground Clearance:	10 in.
Ground Pressure - Empty:	2.71 psi	Fording Depth:	32 in.
- Loaded:	2.92 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	117.5 in.	Vehicle Cone Index (1-Pass):	10
- Width:	30.25 in.	Vehicle Cone Index (50-Pass):	24
- Height:	85 in.	Track or Tire Size:	13.5 x 62 in.
Grouser Height:	51.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	4.45 in.		
Number of Roadwheels or Bogies per Side:	3		

#### Mechanical Components Data

Engine -	Standard: Ford, 250 CID, 140 BHP	Suspension:	Rubber torsion trailing lever.
Optional:	None		
Transmission -	Main: 4 speed manual Synchronesh	Tracks or Wheels:	Endless rubber and fabric reinforced with steel wire with cross-links of spring steel
Optional:	None		
Auxiliary:	None		

#### Miscellaneous

Primary Use:	Small push tractor	Cost:	\$9015
Potential Uses:	Mount for small pull plow.		
Available:	Yes		

Specifications for Vehicle No. 1C3  
 Vehicle Identification: 2100-C Trackmaster

Vehicle Manufacturer: Thielkol Chemical Corporation  
 Logan Division, P. O. Box 407  
 Logan, UT 84321



Trackmaster™ equipped with the new 5th wheel loader frame

SKETCH NOT AVAILABLE

#### General Data

Weight - Basic	6120 lb	Maximum Speed - Land	10 mph
Payload	372 lb	- Water	0 mph
Gross Weight	6500 lb	Ground Clearance	16 in.
Ground Pressure - Empty	0.57 psi	Fording Depth	in.
- Loaded	0.60 psi	Maximum Slope Negotiable	100 %
Overall - Length	170 in.	Vehicle Cone Index (1 Pass)	0
- Width	137 in.	Vehicle Cone Index (50 Pass)	0
- Height	72 in.	Track or Tire Size	57 x 92 in.
Grouser Height	<1.5 in.	Tire Pressure	NA psi
Sprocket Pitch	4.5 in.		
Number of Roadwheels or Bogies per Side	4		

#### Mechanical Components Data

Engine -		Suspension	Rubber compression trailing arm
Standard	Ford, 300 CID, 165 BHP, gasoline, 16		
Optional	391 CID, V-8, 235 BHP		
Transmission -	380 CID, 16, 120 BHP	Tracks or Wheels	Rubber-covered belting with high-strength tempered alloy steel grousers
Main	4 speed manual		
Optional	Automatic		
Auxiliary	None		

#### Miscellaneous

Primary Use	Slope maintenance	Cost	\$18,225
Potential Uses	Mount for push blade or pull plow		
Available	Yes		

Specifications for Vehicle No. 1-4  
Vehicle Identification: Masking Tractor 09a

Vehicle Manufacturer: Bombardier Limited  
Industrial Division  
Valcourt, Quebec, Canada

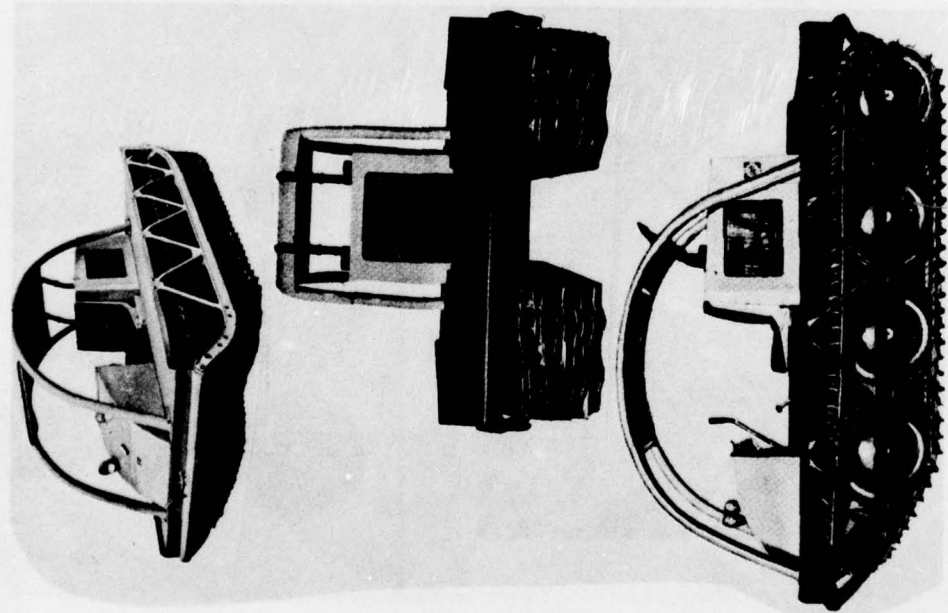
General Data		
Weight - Basic:	7000 lb	Maximum Speed - Land: 23 mph
Payload:	2000 lb	- Water: 0 mph
Gross Weight:	7000 lb	Ground Clearance: 14 in.
Ground Pressure - Empty:	3.32 psi	Fording Depth: 32 in.
- Loaded:	3.42 psi	Maximum Slope Negotiable: 86 %
Overall - Length:	134.5 in.	Vehicle Core Index (1 Pass): 4
- Width:	87.5 in.	Vehicle Core Index (50 Pass): 10
- Height:	78.5 in.	Track or Tire Size: 28 x 90 in.
Grouser Height:	4.5 in.	Tire Pressure: NA psi
Sprocket Pitch:	4.5 in.	
Number of Roadwheels or Bogies per Side:	4	

Mechanical Components Data

Engine -	Suspension	Tandem and rubber bushings
Standard: Chrysler, 318 CID, 187 BHP		
Optional: Perkins diesel, 88 BHP		
Transmission -	Tracks or Wheels:	Rubber and fabric belt, reinforced with steel wire with cross-links of spring steel.
Main: 4 speed manual		
Optional: None		
Auxiliary: None		

Miscellaneous

Primary Use:	Mount for push blade, pull plow, or backhoe	Cost: \$14,432
Potential Uses:	Mount for small drill rig	
Available:	Yes	





Specifications for Vehicle No. I-5  
Vehicle Identification: Amphicat

Vehicle Manufacturer: Mobility Unlimited, Inc.  
44 S. Squirrel Road  
Aborn Heights, MI 48057

#### General Data

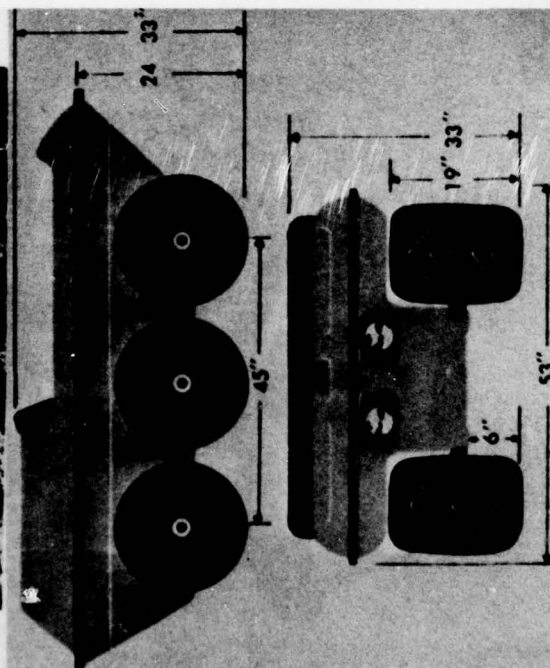
Weight - Basic:	565 lb	Maximum Speed - Land:	37 mph
Payload:	140 lb	- Water:	2 mph
Gross Weight:	925 lb	Ground Clearance:	8 in.
Ground Pressure - Empty:	0.61 psi	Fording Depth:	AMF in.
- Loaded:	1.0 psi	Maximum Slope Negotiable:	70 %
Overall - Length:	83 in.	Vehicle Cone Index (1-Pass):	1
- Width:	53 in.	Vehicle Cone Index (50 Pass):	3
- Height:	34 in.	Track or Tire Size:	11.5 x 20 in.
Nominal Tire Diameter:	20.0 in.	Tire Pressure:	1.5 psi
Nominal Tire Width:	11.5 in.		

#### Mechanical Components Data

Engine -	Suspension: <u>Rigid</u>
Standard: <u>Sacks, 16 BHP</u>	
Optional: <u>None</u>	
Transmission -	Tracks or <u>Wheels</u> <u>11.5 x 20 in. super-soft Amphicat tires</u>
Main: <u>Automatic</u>	
Optional: <u>None</u>	
Auxiliary: <u>None</u>	

#### Miscellaneous

Primary Use:	<u>Reconnaissance and recreation</u>	Cost:	<u>\$2500</u>
Potential Uses:	<u>Surveying</u>		
Available:	<u>Yes</u>		



Specifications for Vehicle No. I-6  
Vehicle Identification: Terra-Jet

Vehicle Manufacturer: Terra-Jet, Inc.  
C. P. 794, P. O. Box  
Drummondville, Quebec, Canada



#### General Data

Weight - Basic:	895 lb	Maximum Speed - Land:	25 mph
Payload:	500 lb	- Water:	-- mph
Gross Weight:	1,395 lb	Ground Clearance:	10 in.
Ground Pressure - Empty:	2.23 psi	Fording Depth:	-- in.
- Loaded:	3.48 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	100 in.	Vehicle Cone Index (1 Pass):	7
- Width:	55.5 in.	Vehicle Cone Index (50 Pass):	17
- Height:	59 in.	Track or Tire Size: 26- x 12- x 12-in. Terra tire	
Nominal Tire Diameter:	26.3 in.		
Nominal Tire Width:	12.2 in.	Tire Pressure:	1 psi

#### Mechanical Components Data

Engine -	Standard: Tecumseh, 4 cycles, 16 BHP	Suspension: Rigid
Optional: None		
Transmission -	Main: 2 speed manual	Tracks or Wheels: Rims 12 x 11 in. with 26- x 12- x 12-in. tires
Optional: None		
Auxiliary: None		

#### Miscellaneous

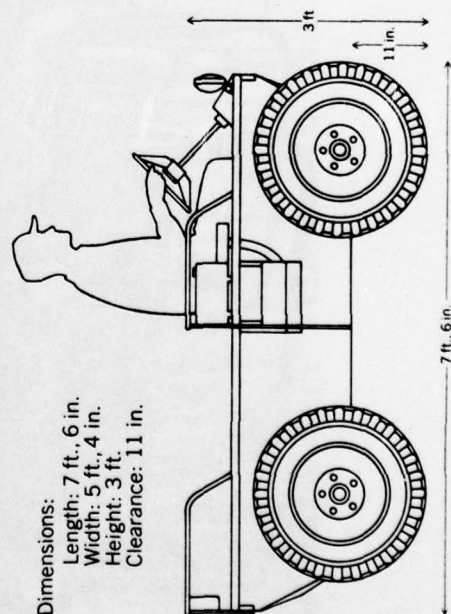
Primary Use: Reconnaissance	Cost: \$2000
Potential Uses: Mount for small push blade or pull plow	
Available: Yes	

SKETCH NOT AVAILABLE

Specifications for Vehicle No. 1-7  
Vehicle Identification: Coot



Dimensions:  
Length: 7 ft., 6 in.  
Width: 5 ft., 4 in.  
Height: 3 ft.  
Clearance: 11 in.



Vehicle Manufacturer: Coot, Inc., World Trade Center  
Ferry Building  
San Francisco, CA 94111

#### General Data

Weight - Basic:	1000 lb	Maximum Speed - Land:	20 mph
Payload:	1000 lb	- Water:	2 mph
Gross Weight:	2000 lb	Ground Clearance:	11 in.
Ground Pressure - Empty:	psi	Fording Depth:	AMP in.
- Loaded:	psi	Maximum Slope Negotiable:	75%
Overall - Length:	90 in.	Vehicle Cone Index (1-Pass):	12
- Width:	64 in.	Vehicle Cone Index (50-Pass):	29
- Height:	36 in.	Track or Tire Size:	885-15 special tires
Nominal Tire Diameter:	26 in.	Tire Pressure:	4 psi
Nominal Tire Width:	9 in.		

#### Mechanical Components Data

Engine -	Suspension: <u>Hydra</u>
Standard: <u>Air cooled, 12 BHP</u>	
Optional: <u>None</u>	
Transmission -	Tracks or Wheels: <u>Standard rim with 885-15 special tires.</u>
Main: <u>Automatic</u>	
Optional: <u>None</u>	
Auxiliary: <u>None</u>	

#### Miscellaneous

Primary Use: <u>Reconnaissance</u>	Cost: <u>\$2000</u>
Potential Uses: <u>Mount for small push blade or pull plow</u>	
Available: <u>Yes</u>	



Specifications for Vehicle No. 1-8  
 Vehicle Identification: Bombi

Vehicle Manufacturer: Bombardier Limited  
 Industrial Division  
 Valcourt, Quebec, Canada

### General Data

Weight - Basic:	2000 lb	Maximum Speed - Land:	22.5 mph
Payload:	1000 lb	- Water:	0 mph
Gross Weight:	3000 lb	Ground Clearance:	12.5 in.
Ground Pressure - Empty:	0.82 psi	Fording Depth:	in.
- Loaded:	1.23 psi	Maximum Slope Negotiable:	80 %
Overall - Length:	102 in.	Vehicle Cone Index (1-Pass):	5
- Width:	60 in.	Vehicle Cone Index (50-Pass):	13
- Height:	69 in.	Track or Tire Size:	18 x 68 in.
Grouser Height:	4.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	2.5 in.		
Number of Roadwheels or Bogies per Side:	4		

### Mechanical Components Data

Engine - Standard: Ford, 57 BHP  
 Optional: None

Transmission - Main: 4 speed manual  
 Optional: None  
 Auxiliary: None

Suspension: All wheels mounted on rubber torsion trailing levers

Tracks or Wheels: Rubber and fabric belts with forged spring steel cross-links

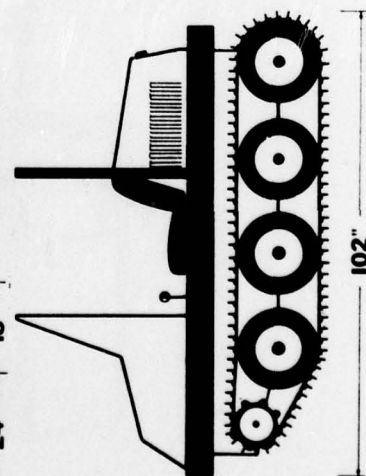
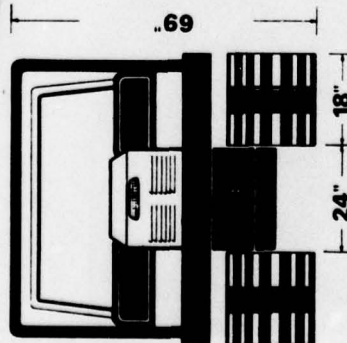
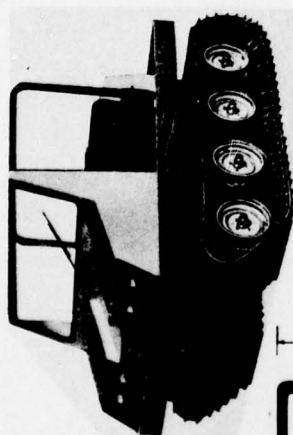
### Miscellaneous

Primary Use: Reconnaissance

Potential Uses: Mount for small push blade or pull plow

Available: Yes

Cost: \$6050



Specifications for Vehicle No. I-9  
 Vehicle Identification: The Kidd

Vehicle Manufacturer: Kinetics International Division  
 LTV Aerospace Corporation, P. O. Box 493  
 Tyler, TX 75701

General Data

Weight - Basic:	2200 lb	Maximum Speed - Land:	25 mph
Payload:	1000 lb	- Water:	1.5 mph
Gross Weight:	3200 lb	Ground Clearance:	6.5 in.
Ground Pressure - Empty:	1.61 psi	Fording Depth:	AMP in.
- Loaded:	2.34 psi	Maximum Slope Negotiable:	70 %
Overall - Length:	96 in.	Vehicle Core Index (1-Pass):	11
- Width:	60 in.	Vehicle Core Index (50-Pass):	26
- Height:	40 in.	Track or Tire Size: 23 x 8.50-12	
Nominal Tire Diameter:	23.0 in.	Tire Pressure:	3 psi
Nominal Tire Width:	8.5 in.		

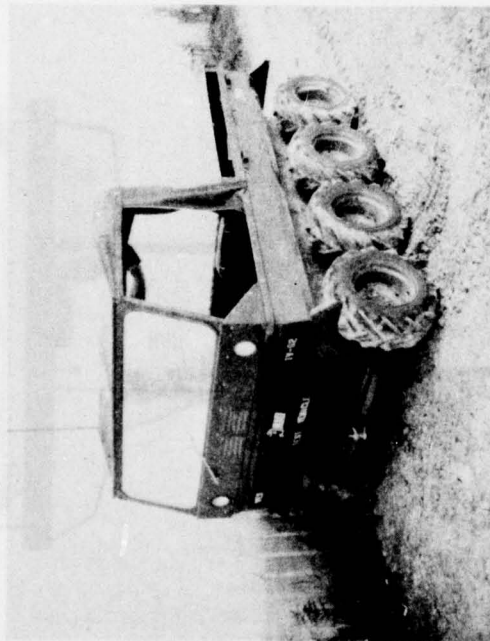
Mechanical Components Data

Engine -	Suspension: Rigid
Standard: 30 BHP, gasoline	
Optional: 30 BHP, diesel	
Transmission -	Tracks or Wheels: 23 x 8.50-12 tires on 12-in. rim
Main: Automatic	
Optional: None	
Auxiliary: None	

SKETCH NOT AVAILABLE

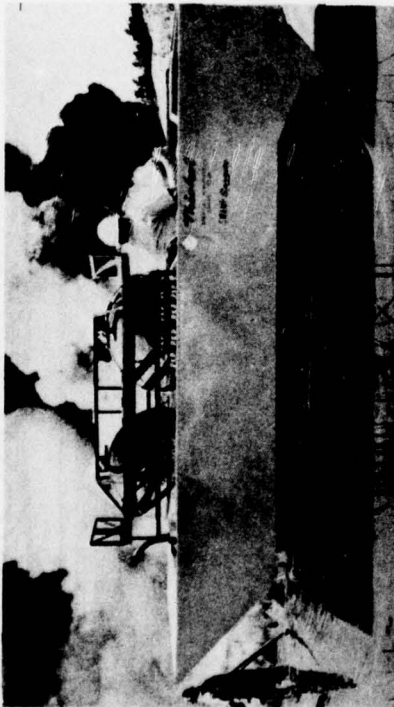
Miscellaneous

Primary Use: Reconnaissance	Cost: \$2000
Potential Uses: Plow, rake, and tiller attachments available	
Available: Yes	



Specifications for Vehicle No. I-10  
Vehicle Identification: Thikol Swamp Spryte 1301

Vehicle Manufacturer: Thikol Chemical Corporation  
Logan Division  
Logan, UT 84321



#### General Data

Weight - Basic:	3000 lb	Maximum Speed - Land:	35 mph
Payload:	1000 lb	- Water:	1.5 mph
Gross Weight:	4000 lb	Ground Clearance:	12 in.
Ground Pressure - Empty:	0.70 psi	Fording Depth:	AMP in.
- Loaded:	1.04 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	152 in.	Vehicle Cone Index (1-Pass):	1
- Width:	77.5 in.	Vehicle Cone Index (50-Pass):	0
- Height:	72 in.	Track or Tire Size:	26 x 90 in.
Grouser Height:	≤ 1.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	4.5 in.		
Number of Roadwheels or Bogies per Side:	4		

#### Mechanical Components Data

Engine -	Suspension:
Standard: Ford, 6 cylinder, 170 CID, 101 BHP	Trailing arms with torsion springs
Optional: None	
Transmission -	Tracks or Wheels:
Main: 4 speed manual	4 ply, rubber-covered belting with tubular steel grousers.
Optional: None	
Auxiliary: None	

#### Miscellaneous

Primary Use: Reconnaissance and surveying	Cost:
Potential Uses: Mount for push blade or pull plow.	
Available: Yes	

SKETCH NOT AVAILABLE



Specifications for Vehicle No. 1-11  
Vehicle Identification: FN 10

Vehicle Manufacturer: Flextrac Rodwell, P. O. Box 5914  
Station A, 1201 42nd Ave, SE  
Calgary, Alberta, Canada

#### General Data

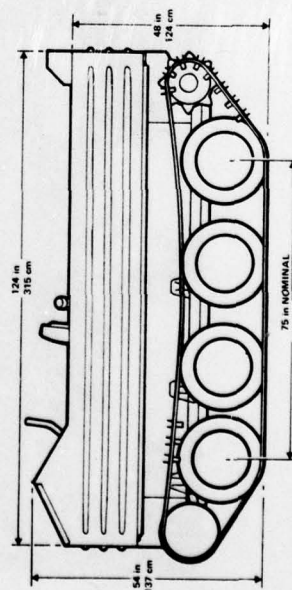
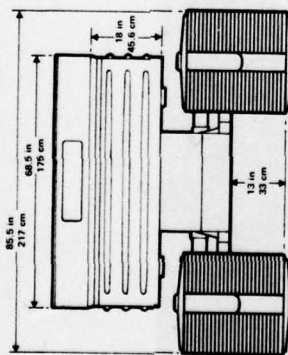
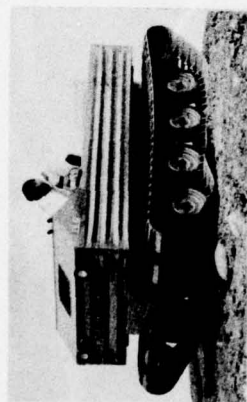
Weight - Basic:	3550 lb	Maximum Speed - Land:	22 mph
Payload:	1000 lb	- Water:	2 mph
Gross Weight:	4550 lb	Ground Clearance:	13 in.
Ground Pressure - Empty:	0.95 psi	Fording Depth:	AMP in.
- Loaded:	1.21 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	13.27 in.	Vehicle Cone Index (1-Pass):	4
- Width:	85.5 in.	Vehicle Cone Index (50-Pass):	10
- Height:	80.0 in.	Track or Tire Size: 25 x 75 in.	
Grouser Height:	<1.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	6.00 in.		
Number of Roadwheels or Bogies per Side:	4		

#### Mechanical Components Data

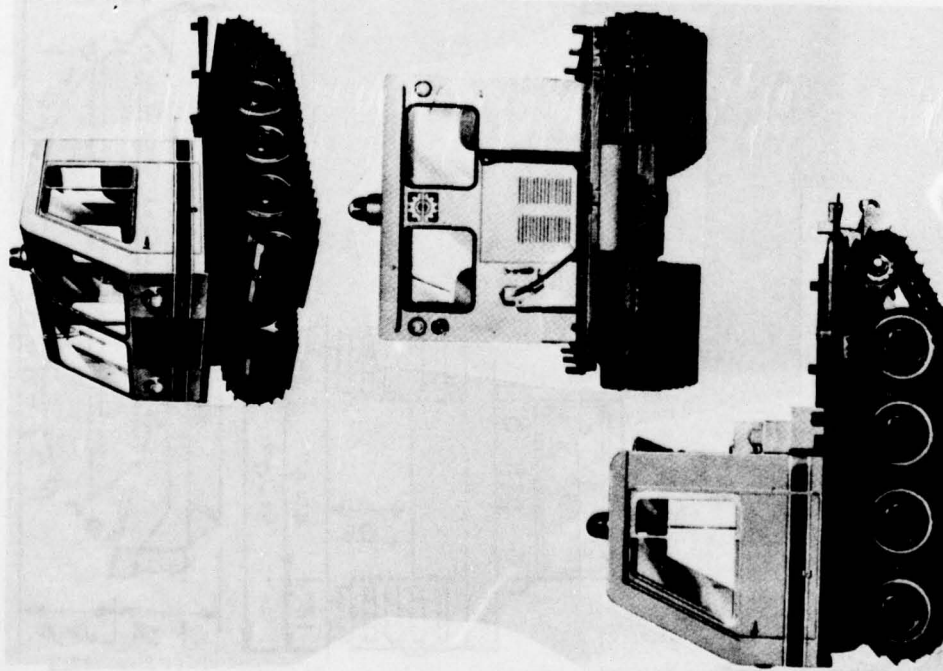
Engine -		Suspension:	Weldbent, rubber in compression
Standard:	Ford, 104 CID, V-4, gasoline, 65 BHP		
Optional:	Diesel		
Transmission -		Tracks or Wheels:	Rubber belt and channel grouser
Main:	3 speed manual		
Optional:	Automatic		
Auxiliary:	2 speed transfer		

#### Miscellaneous

Primary Use:	Cargo and personnel carrier	Cost:	\$15,391
Potential Uses:	Mount for small push blade or pull plow		
Available:	Yes		



Specifications for Vehicle No. I-12  
 Vehicle Identification: Skidozer 200



A15

Vehicle Manufacturer: Bombardier Limited  
 Industrial Division  
 Valcourt, Quebec, Canada

#### General Data

Weight - Basic:	4400 lb	Maximum Speed - Land:	21.5 mph
Payload:	1000 lb	- Water:	0 mph
Gross Weight:	5400 lb	Ground Clearance:	14.5 in.
Ground Pressure - Empty:	0.84 psi	Fording Depth:	32.5 in.
- Loaded:	1.03 psi	Maximum Slope Negotiable:	50 %
Overall - Length:	133 in.	Vehicle Cone Index (1-Pass):	3
- Width:	8 in.	Vehicle Cone Index (50-Pass):	8
- Height:	87 in.	Track or Tire Size:	29 x 90 in.
Grouser Height:	<1.5 in.	Tire Pressure:	N/A psi
Sprocket Pitch:	4.45 in.		
Number of Roadwheels or Bogs per Side:	4		

#### Mechanical Components Data

Engine -  
 Standard: Ford, 250 CID, 6 cylinder,  
 124 BHP  
 Optional: None

Transmission -  
 Main: 3 speed automatic  
 Optional: None  
 Auxiliary: None

Suspension: Wheels mounted on rubber torsion trailing arms

Tracks or Wheels: Four belts each measuring 12-in., rubber and nylon fabric with 29-in. steel cross-links

#### Miscellaneous

Primary Use: Cargo carrier

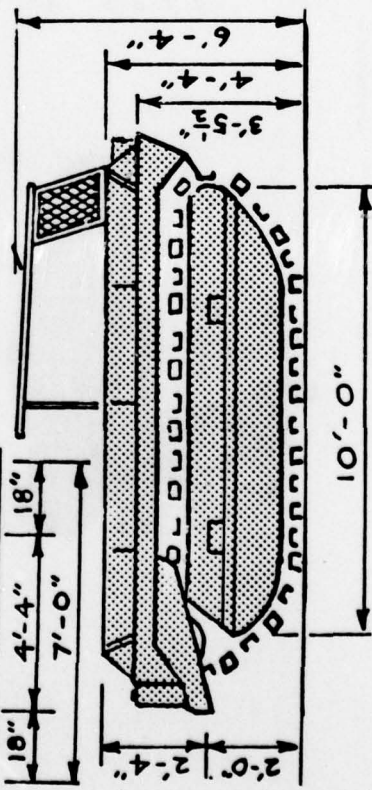
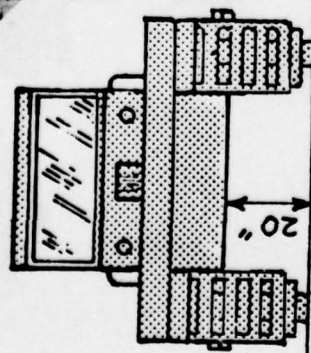
Potential Uses: Mount for small drill rig, push blade or pull plow

Available: Yes

Cost: \$12,608

Specifications for Vehicle No. I-13  
 Vehicle Identification: The Marsh Cub (Model 104V-LFC-68)

Vehicle Manufacturer: Quality Marsh Equipment Co., Inc.  
 P. O. Box 406  
 Thibodaux, LA 70301

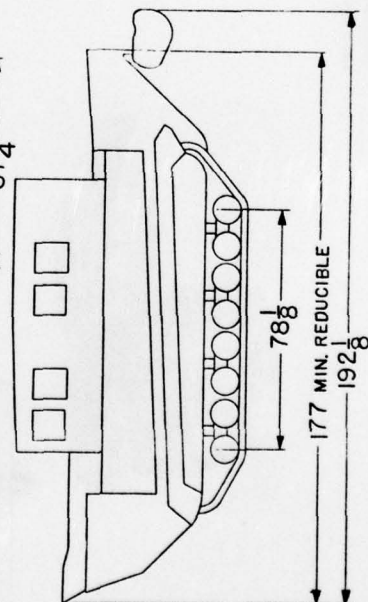
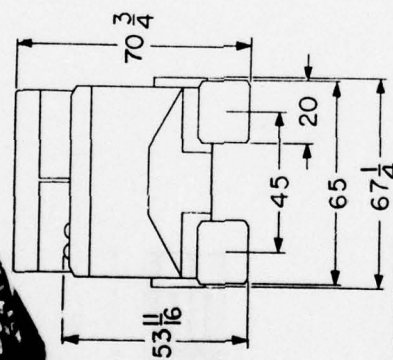
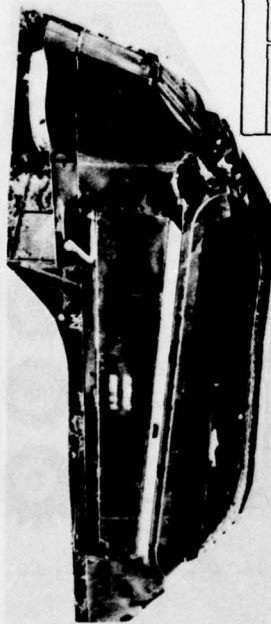


General Data			
Weight - Basic:	1768 lb	Maximum Speed - Land:	8 mph
Payload:	750 lb	- Water:	2-4 mph
Gross Weight:	5538 lb	Ground Clearance:	20 in.
Ground Pressure - Empty:	1.75 psi	Fording Depth:	AMP in.
- Loaded:	2.02 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	152 in.	Vehicle Cone Index (1-Pass):	7
- Width:	84 in.	Vehicle Cone Index (50 Pass):	17
- Height:	76 in.	Track or Tire Size: 16 x 76 in.	
Grouser Height:	<1.5 in.	Tire Pressure:	34 psi
Sprocket Pitch:	4 in.		
Number of Roadwheels or Bogies per Side:	4		

Mechanical Components Data	
Engine -	Suspension: Rigid
Standard: 75 BHP, gasoline	
Optional: None	
Transmission -	Tracks or Wheels: 2 strands of heavy-duty track chain with 4-in. aluminum cleats
Main: Automatic	
Optional: None	
Auxiliary: None	
Miscellaneous	
Primary Use: Cargo and personnel carrier	Cost: _____
Potential Uses: Mount for small push blade or full plow.	
Available: Yes	



Specifications for Vehicle No. 1-14  
Vehicle Identification: M99C, Kennel



Vehicle Manufacturer: Property of U. S. Army

### General Data

Weight - Basic:	4800 lb	Maximum Speed - Land:	36 mph
Payload:	1200 lb	- Water:	4 mph
Gross Weight:	6000 lb	Ground Clearance:	11 in.
Ground Pressure - Empty:	1.53 psi	Fording Depth:	AMP in.
- Loaded:	1.91 psi	Maximum Slope Negotiable:	100 %
Overall - Length:	192 in.	Vehicle Cone Index (1-Pass):	6
- Width:	57.25 in.	Vehicle Cone Index (50-Pass):	12
- Height:	70.75 in.	Track or Tire Size:	20 x 78.5 in.
Crawler Height:	41.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	4.5 in.		
Number of Roadwheels or Bogies per Side:	4		

### Mechanical Components Data

Engine -	Suspension: Leaf springs
Standard: 6 cylinder, 65 BHP	
Optional: None	
Transmission -	Tracks or Wheels: Type T7681, 4-1/2- x 20-in. track shoes, 56 per track
Main: Automatic Synchronesh	
Optional: None	
Auxiliary:	

### Miscellaneous

Potential Use: Cargo carrier	Cost: Military
Potential Uses: Mount for small push blade or pull plow	
Available: Possibly on Army surplus	

Specifications for Vehicle No. 1-15  
Vehicle Identification: Skidozer 301-D

Vehicle Manufacturer: Bombardier Limited  
Industrial Division  
Valcourt, Quebec, Canada

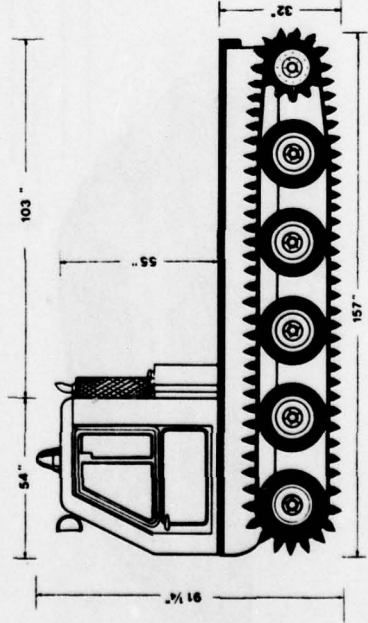
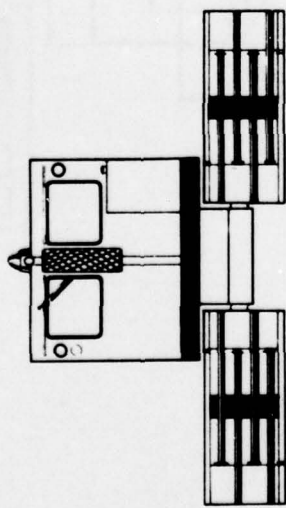
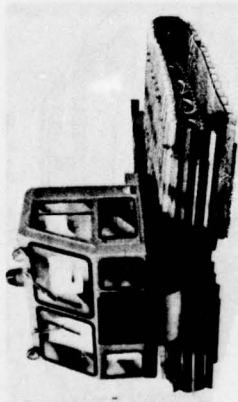
General Data			
Weight - Basic	6500 lb	Maximum Speed - Land	11.0 mph
Payload	1000 lb	- Water	0 mph
Gross Weight	7500 lb	Ground Clearance	14.5 in.
Ground Pressure - Empty	0.10 psi	Fording Depth	30 in.
- Loaded	0.16 psi	Maximum Slope Negotiable	60 %
Overall - Length	157 in.	Vehicle Cone Index (1-Pass)	0
- Width	140 in.	Vehicle Cone Index (50-Pass)	2
- Height	21-1/4 in.	Track or Tire Size	53 x 150 in.
Grouser Height	41.5 in.	Tire Pressure	NA psi
Sprocket Pitch	4.15 in.		
Number of Roadwheels or Bogies per Side	4		

#### Mechanical Components Data

Engine -		Suspension	Ten wheels mounted on rubber torsion trailing levers
Standard	Perkins diesel model No. 4,236 - 68 BHP		
Optional			
Transmission -		Tracks or Wheels	Eight rubber and fabric track belts, all-aluminum staggered cross-links
Main	4 speed manual new process gear 435-A		
Optional			
Auxiliary			

#### Miscellaneous

Primary Use	Cargo carrier	Cost	\$21,100
Potential Uses	Mount for small push blade or pull plow		
Available	Yes		



Specifications for Vehicle No. I-16  
 Vehicle Identification: 1404 IMP

Vehicle Manufacturer: Thiokol Chemical Corporation  
 Logan Division  
 Logan, UT 84301



# General Data

Weight - Basic:	2625 lb	Maximum Speed - Land:	25 mph
Payload:	1400 lb	- Water:	0 mph
Gross Weight:	3825 lb	Ground Clearance:	6 in.
Ground Pressure - Empty:	0.75 psi	Fording Depth:	-- in.
- Loaded:	1.17 psi	Maximum Slope Negotiable:	50 %
Overall - Length:	11.6 in.	Vehicle Cone Index (1-Pass):	4
- Width:	70 in.	Vehicle Cone Index (50-Pass):	10
- Height:	73.5 in.	Track or Tire Size:	14 x 68 in.
Crawler Height:	4.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	4		
Number of Roadwheels or Bogies per Side:	4		

# Mechanical Components Data

Engine -		Suspension:	Semelliptic springs
Standard:	Ford, V-8, 104 CID, 80 HP		
Optional:	None		
Transmission -		Tracks or Wheels:	Drop center plus tire guides
Main:	3 speed manual		
Optional:	None		
Auxiliary:	4 speed transfer		

SKETCH NOT AVAILABLE

# Miscellaneous

Primary Use:	Cargo carrier	Cost:	\$9,200
Potential Uses:	Mount for push blade or pull plow		
Available:	Yes		



Specifications for Vehicle No. 1-17  
Vehicle Identification: Skidoozer 301

Vehicle Manufacturer: Bombardier Limited  
Industrial Division  
Valcourt, Quebec, Canada

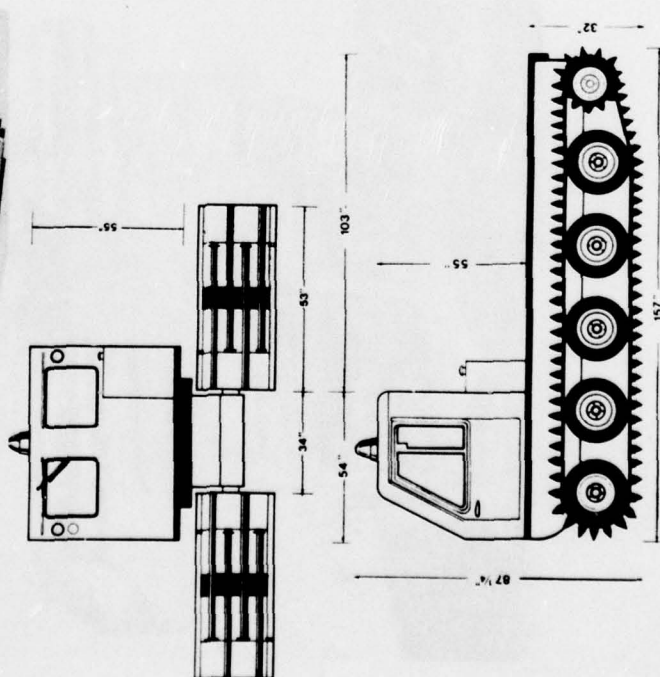
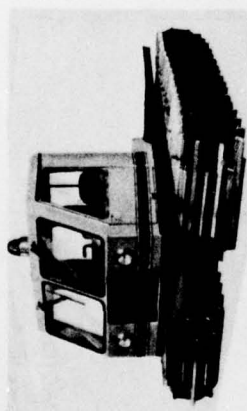
General Data			
Weight - Basic:	6000 lb	Maximum Speed - Land	11.5 mph
Payload:	1500 lb	- Water	0 mph
Gross Weight:	7500 lb	Ground Clearance:	14.50 in.
Ground Pressure - Empty:	0.36 psi	Fording Depth:	32 in.
- Loaded:	0.45 psi	Maximum Slope Negotiable	60 %
Overall - Length:	157 in.	Vehicle Cone Index (1 Pass)	0
- Width:	130 in.	Vehicle Cone Index (50 Pass)	2
- Height:	87.25 in.	Track or Tire Size: 53 x 157 in.	
Grouser Height:	4.5 in.	Tire Pressure:	30 psi
Sprocket Pitch:	5		
Number of Roadwheels or Bogies per Side:			

#### Mechanical Components Data

Engine -		Suspension:	Two wheels mounted on rubber torsion trailing levers
Standard:	Ford, 300 CID, Industrial, 6 cylinder engine		
Optional:	None		
Transmission -		Tracks or Wheels:	Eight rubber and fabric track belts, all-aluminum staggered cross-link
Main:	3 speed Ford automatic F902 transmission		
Optional:	None		
Auxiliary:	None		

#### Miscellaneous

Primary Use:	Cargo carrier	Cost:	\$19,760
Potential Uses:	Mount for small drill rig, push blade, or pull plow		
Available:	Yes		



Specifications for Vehicle No. I-18  
Vehicle Identification: Marsh Screw Amphibian

Vehicle Manufacturer: Manufactured by Chrysler Corporation for the  
U. S. Navy



#### General Data

Weight - Basic:	2924 lb	Maximum Speed - Land	-- mph
Payload:	1000 lb	- Water	-- mph
Gross Weight:	2924 lb	Ground Clearance	20 in.
Ground Pressure - Empty:	0.50 psi	Fording Depth:	AMP in.
- Loaded:	0.72 psi	Maximum Slope Negotiable:	-- %
Overall - Length:	164 in.	Vehicle Cone Index (1-Pass):	1*
- Width:	28 in.	Vehicle Cone Index (50-Pass):	1*
- Height:	21 in.	Track or Tire Size:	NA
Rotor Diameter:	26 in.	Tire Pressure:	NA psi

\*\* At 3-in. penetration

\* Experimental values

#### Mechanical Components Data

Engine -		Suspension:	Rigid
Standard:	Chrysler - 40 special, 116 HP		
Optional:	None		
Transmission -		Tracks or Wheels:	Helical screws
Main:	Chrysler Torque Flite		
Optional:			
Auxiliary:			

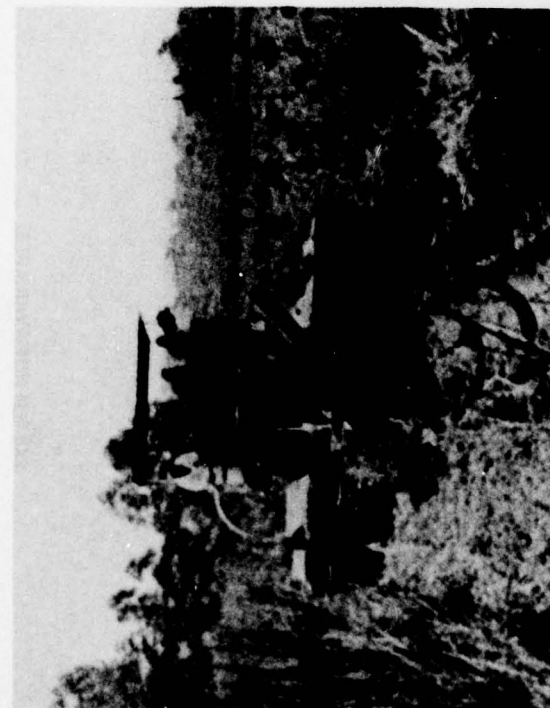
#### Miscellaneous

Primary Use:	Reconnaissance	Cost:	
Potential Uses:	Mount for small push blade or pull plow		
Available:	Possibly on surplus		

SKETCH NOT AVAILABLE

Specifications for Vehicle No. 1-19  
 Vehicle Identification: Ditcher Model 1047-58P-70

Vehicle Manufacturer: Quality Marsh International Corp.  
 P. O. Box 406  
 Thibodaux, LA 70301



A22

# General Data

Weight - Basic:	22,000 lb	Maximum Speed - Land:	5 mph
Payload:	1,500 lb	- Water:	3-4 mph
Gross Weight:	23,500 lb	Ground Clearance:	38 in.
Ground Pressure - Empty:	1.21 psi	Fording Depth:	AMP in.
- Loaded:	1.29 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	in.	Vehicle Cone Index (1-Pass):	0
- Width:	in.	Vehicle Cone Index (50-Pass):	2
- Height:	in.	Track or Tire Size:	48 x 190 in.
Grouser Height:	51.5 in.	Tire Pressure:	MA psi
Sprocket Pitch:	2.5 in.		
Number of Roadwheels or Bogies per Side:	4		

# Mechanical Components Data

Engine -	Suspension:	
Standard: Ford, 380 CID, diesel	Rigid	
Optional: None		
Transmission -	Tracks or Wheels:	Two stands of heavy-duty track chains with 4-in. aluminum channel cleats
Main: Automatic		
Optional: None		
Auxiliary: None		

SKETCH NOT AVAILABLE

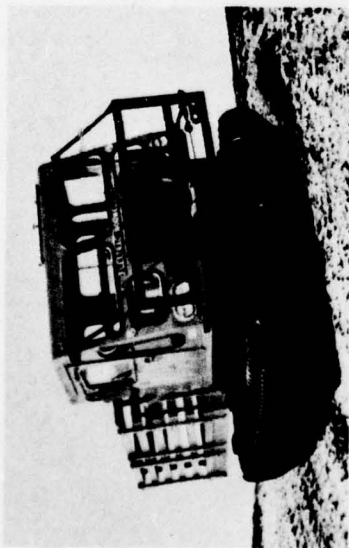
# Miscellaneous

Primary Use:	Ditching machine	Cost:	\$37,500
Potential Uses:	Mount for pull plow or push blade		
Available:	Yes		



Index of Group II Vehicles, 1- to 2-1/2-Ton Payload

<u>Vehicle No.</u>	<u>Vehicle Identification</u>
II-1	FN 20
II-2	Model 1201 Spryte
II-3	Riverine Utility Craft
II-4	FN 21
II-5	M116
II-6	FN 20 W/B
II-7	Rolligon 4450
II-8	XM759, Cargo Carrier
II-9	Mexa 10 x 10
II-10	Mexa Track
II-11	Amphibious Carrier Model 104-W-HD-59



Specifications for Vehicle No. II-1  
Vehicle Identification: FN 20

Vehicle Manufacturer: Flextrac Rodwell, P. O. Box 5544  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada

#### General Data

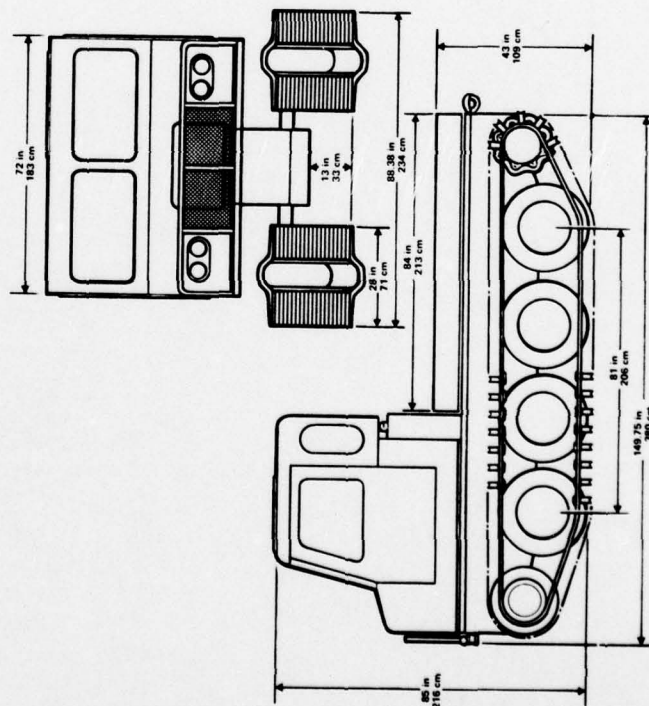
Weight - Basic:	5600 lb	Maximum Speed - Land:	27 mph
Payload:	2000 lb	- Water:	0 mph
Gross Weight:	7600 lb	Ground Clearance:	12 in.
Ground Pressure - Empty:	1.23 psi	Fording Depth:	32 in.
- Loaded:	1.69 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	156 in.	Vehicle Core Index (1-Pass):	5
- Width:	88.5 in.	Vehicle Core Index (50-Pass):	13
- Height:	85 in.	Track or Tire Size: 28 x 81 in.	
Grouser Height:	<1.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	7 in.		
Number of Roadwheels or Bogs per Side:	4		

#### Mechanical Components Data

Engine -	Suspension: Crank arm and torsion coil spring
Standard: Ford, 200 CID, 6 cylinder,	
Optional: Diesel	
Transmission -	Tracks or Wheels: Rubber belt and spring steel drop center grouser
Main: 4 speed manual	
Optional: Automatic	
Auxiliary: None	

#### Miscellaneous

Primary Use: Cargo and personnel carrier	Cost: \$16,947
Potential Uses: Mount for small drill rig, push blade, or pull plow	
Available: Yes	



Specifications for Vehicle No. 11-2  
 Vehicle Identification: Model 1201 Spryte

Vehicle Manufacturer: Thokol Chemical Corporation  
 Logan Division  
 Logan, UT 84321



A25

#### General Data

Weight - Basic:	6180 lb	Maximum Speed - Land:	14.7 mph
Payload:	1900 lb	- Water:	-- mph
Gross Weight:	8080 lb	Ground Clearance:	11 in.
Ground Pressure - Empty:	0.88 psi	Fording Depth:	-- in.
- Loaded:	1.15 psi	Maximum Slope Negotiable:	80 %
Overall - Length:	194.5 in.	Vehicle Cone Index (1-Pass):	3
- Width:	34.8 in.	Vehicle Cone Index (50-Pass):	8
- Height:	84 in.	Track or Tire Size: 36 x 98 in.	
Grouser Height:	41.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	4.5 in.		
Number of Roadwheels or Bogies per Side:	5		

#### Mechanical Components Data

Engine -	Suspension
Standard: Ford, 6 cylinder, 300 CID,	Trailing arm in rubber
Optional: 170 BHP	
Transmission -	Tracks or Wheels
Main: Ford C-6 Automatic	Rubber-covered polyester fabric with steel grousers
Optional: None	
Auxiliary: None	

SKETCH NOT AVAILABLE

#### Miscellaneous

Primary Use: Cargo carrier	Cost: \$16,400
Potential Uses: Mount for small drill rig, push blade, or pull plow	
Available: Yes	



Specifications for Vehicle No. 11-1  
Vehicle Identification: Riverine Utility Craft (RUC)

Vehicle Manufacturer: Developed by Chrysler Corporation for the U. S. Navy



General Data			
Weight - Basic:	11,085 lb	Maximum Speed - Land:	14 mph
Payload:	2000 lb	- Water:	18 mph
Gross Weight:	13,085 lb	Ground Clearance:	19 in.
Ground Pressure - Empty:	psi	Fording Depth:	AMP in.
- Loaded:	psi	Maximum Slope Negotiable:	%
Overall - Length:	24.2 in.	Vehicle Cone Index (1 Pass):	0 *
- Width:	in.	Vehicle Cone Index (50 Pass):	0 *
- Height:	107 in.	Track or Tire Size:	Helical screw
Rotor Diameter:	39 in.	Tire Pressure:	NA psi

\* Experimental values

Mechanical Components Data

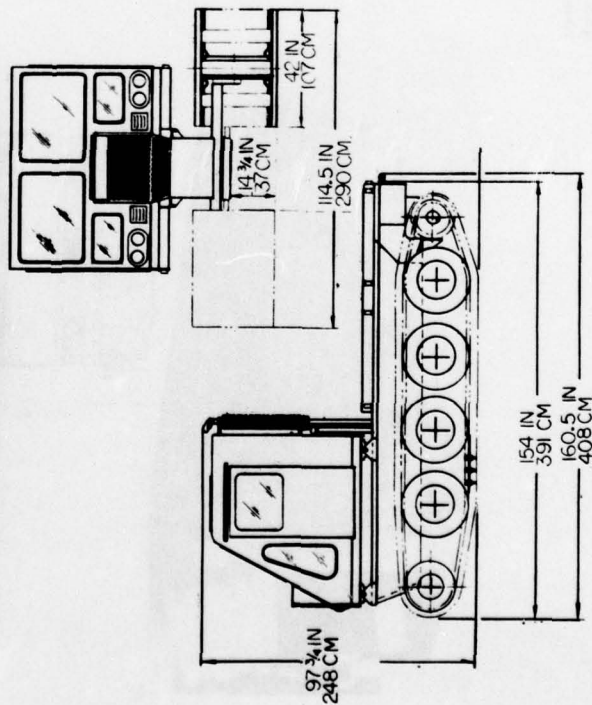
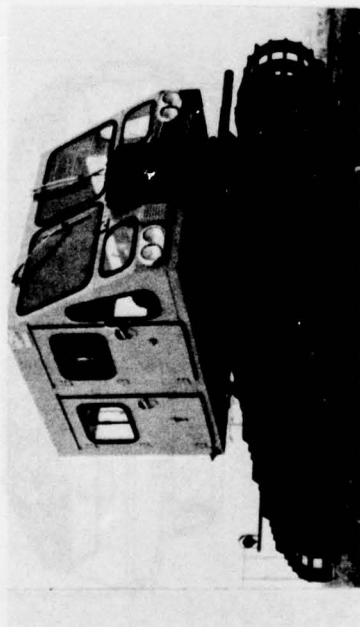
Engine -	Suspension: Rigid
Standard: 2 each, 440 CID, 380 BHP	
Optional: None	
Transmission -	Tracks or Wheels: Special 58-in.-diameter helical screw
Main: 2 each 2 speed automatic	
Optional: None	
Auxiliary: None	

Miscellaneous

Primary Use: Cargo or personnel carrier	Cost: _____
Potential Uses: Mount for small drill rig, push blade, or pull plow	
Available: Possibly from DMRP	

SKETCH NOT AVAILABLE

Specifications for Vehicle No. 11-4  
Vehicle Identification: FN 21



Vehicle Manufacturer: Flextrac Motwell, P. O. Box 5544  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada

#### General Data

Weight - Basic:	11,000 lb	Maximum Speed - Land:	14 mph
Payload:	2,100 lb	- Water:	0 mph
Gross Weight:	13,100 lb	Ground Clearance:	14.75 in.
Ground Pressure - Empty:	0.85 psi	Fording Depth:	30 in.
- Loaded:	1.01 psi	Maximum Slope Negotiable:	70 %
Overall - Length:	154 in.	Vehicle Cone Index (1 Pass):	2
- Width:	114.5 in.	Vehicle Cone Index (50 Pass):	6
- Height:	98 in.	Track or Tire Size:	42 x 154 in.
Grouser Height:	51.5 in.		
Sprocket Pitch:	7.0 in.	Tire Pressure:	NA psi
Number of Roadwheels or Bogs per Side:	4		

#### Mechanical Components Data

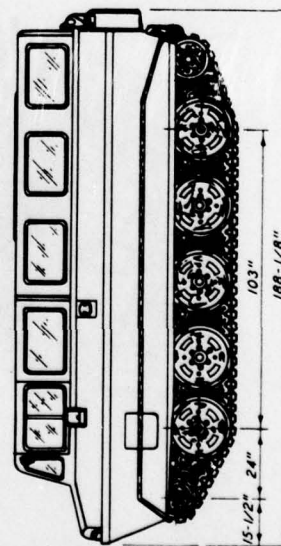
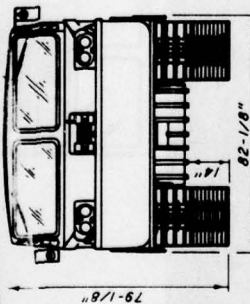
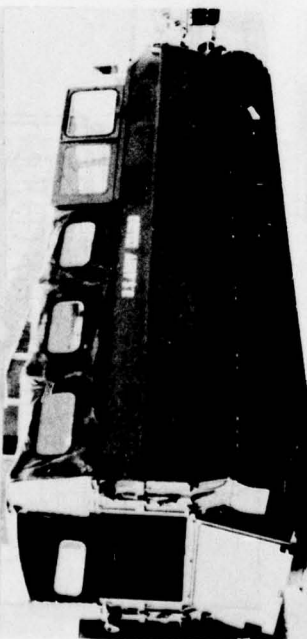
Engine -	Suspension: Crank arm with torsion
Standard: Ford, 250 CID, 108 BHP	
Optional: Ford, 300 CID, 132 BHP, Perkins diesel	
Transmission -	Tracks or Wheels: Rubber belts with one-piece, high-strength, aluminum alloy grousers.
Main: 4 speed manual	
Optional: Automatic	
Auxiliary: None	

#### Miscellaneous

Primary Use:	Cargo carrier	Cost:	\$19,759
Potential Uses:	Mount for small drill rig, push blade, or pull plow		
Available:	Yes		

Specifications for Vehicle No. 11-5  
 Vehicle Identification: ML16

Vehicle Manufacturer: Property of U. S. Army



#### General Data

Weight - Basic:	7,880 lb	Maximum Speed - Land:	37 mph
Payload:	3,000 lb	- Water:	4 mph
Gross Weight:	10,880 lb	Ground Clearance:	15.5 in.
Ground Pressure - Empty:	3.91 psi	Fording Depth:	AVE: in.
- Loaded:	2.64 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	188.0 in.	Vehicle Cone Index (1-Pass):	7
- Width:	82 in.	Vehicle Cone Index (50-Pass):	13
- Height:	79 in.	Track or Tire Size:	20 x 103 in.
Grouser Height:	<1.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	4 in.		
Number of Roadwheels or Bogs per Side:	5		

#### Mechanical Components Data

Engine - Standard: 283 CID, V-8, 160 BHP  
 Optional: None

Transmission - Main: 3 speed automatic  
 Optional: None  
 Auxiliary: None

Suspension: Individual Torsion Bar

Tracks or Wheels: Rubber band, 22 sections 32 in. long with 4-in. wide x 20-in. track cleats

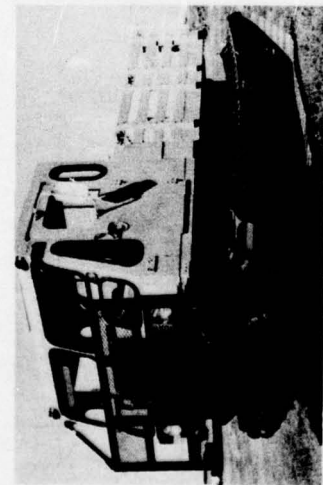
#### Miscellaneous

Primary Use: Cargo carrier Cost: \_\_\_\_\_

Potential Uses: Mount for small drill rig, push blade, or pull plow

Available: Possibly Army surplus





Specifications for Vehicle No. 11-6  
Vehicle Identification: FN 20 W/B

Vehicle Manufacturer: Flextrac Nodwell, P. O. Box 5544  
Station A, 1201 42nd Ave, SE  
Calgary, Alberta, Canada

#### General Data

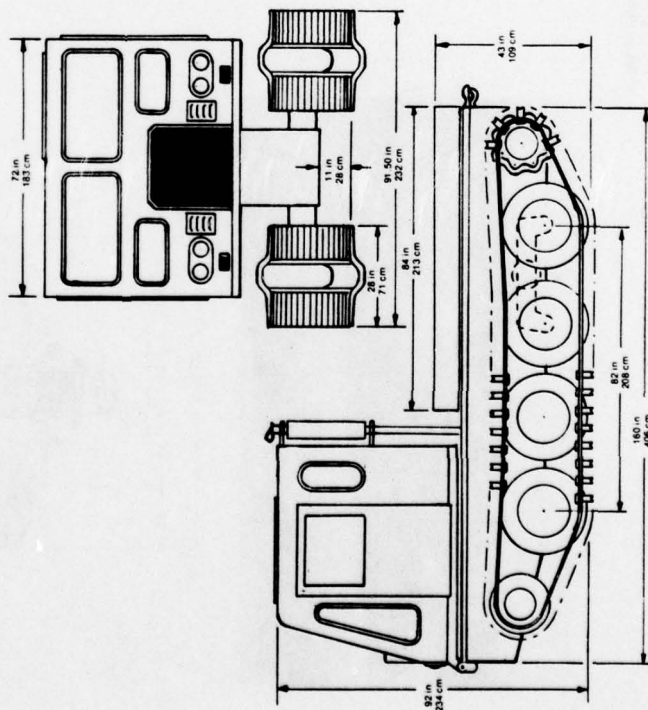
Weight - Basic:	7,300 lb	Maximum Speed - Land:	25 mph
Payload:	3,500 lb	- Water:	0 mph
Gross Weight:	10,800 lb	Ground Clearance:	11 in.
Ground Pressure - Empty:	3.59 psi	Fording Depth:	32 in.
- Loaded:	2.35 psi	Maximum Slope Negotiable:	4.5 %
Overall - Length:	3.60 in.	Vehicle Cone Index (1-Pass):	6
- Width:	91.5 in.	Vehicle Cone Index (50-Pass):	15
- Height:	92 in.	Track or Tire Size:	28 x 82 in.
Grouser Height:	<3.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	7 in.		
Number of Roadwheels or Bogies per Side:	4		

#### Mechanical Components Data

Engine -	Suspension:	Walking beam
Standard: Ford, 250 CID, 6 cylinder, 108 BHP		
Optional: Diesel		
Transmission -	Tracks or Wheels:	Rubber belt and spring steel drop center grousers
Main: 4 speed manual		
Optional: Automatic		
Auxiliary:		

#### Miscellaneous

Primary Use:	Cargo carrier	Cost:	\$16,947
Potential Uses:	Mount for small drill rig, push blade, or pull plow		
Available:	Yes		



Specifications for Vehicle No. 11-7  
Vehicle Identification: Rolligon 4450

Vehicle Manufacturer: The Rolligon Corporation  
10635 Brighton Lane  
Stafford, TX 77477

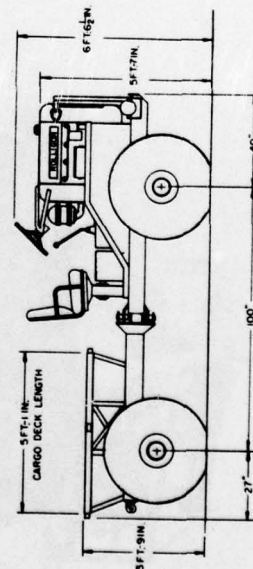
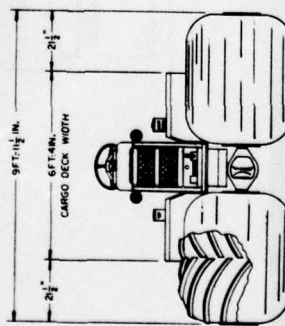
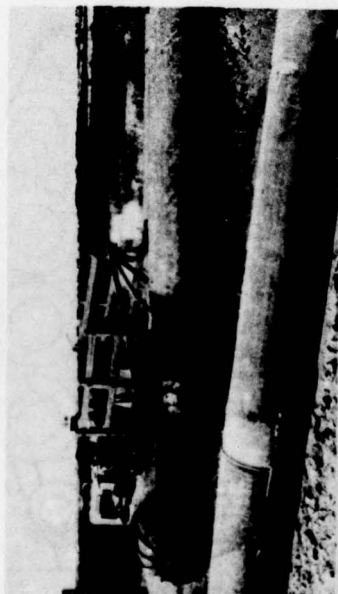
General Data			
Weight - Basic:	3500 lb	Maximum Speed - Land:	24 mph
Payload:	4000 lb	- Water:	2 mph
Gross Weight:	7500 lb	Ground Clearance:	19 in.
Ground Pressure - Empty:	psi	Fording Depth:	AMP in.
- Loaded:	psi	Maximum Slope Negotiable:	60 %
Overall - Length:	161 in.	Vehicle Cone Index (1 Pass):	7
- Width:	112.5 in.	Vehicle Cone Index (50 Pass):	18
- Height:	78.5 in.	Track or Tire Size: 40 x 50 Rolligon	
Nominal Tire Diameter:	40 in.	Tire Pressure:	6 psi
Nominal Tire Width:	50 in.		

Mechanical Components Data

Engine -	Suspension: Rigid
Standard: 4 cylinder diesel, 59 BHP	
Optional: Gasoline	
Transmission -	Tracks or Wheels: 40 x 50 12-ply cleated Rolligon tires with special rims
Main: 4 speed manual	
Optional: None	
Auxiliary: None	

Miscellaneous

Primary Use: Cargo carrier	Cost: \$16,450
Potential Uses: Mount for small drill rig, push blade, or pull plow	
Available: Yes	



Specifications for Vehicle No. 11-1  
 Vehicle Identification: XOT59, Cargo Carrier

Vehicle Manufacturer: Developed by Pacific Car and Foundry for the U. S. Army



A31

General Data			
Weight - Basic:	10,000 lb	Maximum Speed - Land:	30 mph
Payload:	3,000 lb	- Water:	5 mph
Gross Weight:	13,000 lb	Ground Clearance:	33 in.
Ground Pressure - Empty:	1.77 psi	Fording Depth:	AMP in.
- Loaded:	2.62 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	24.5 in.	Vehicle Core Index (1-Pass):	0 •
- Width:	11.0 in.	Vehicle Core Index (50-Pass):	2 •
- Height:	102 in.	Track or Tire Size: pneumatic track or tires, 24 x 106 in.	
Grouser Height:	41.5 in.	Tire Pressure:	3 psi
Sprocket Pitch:	3.12 in.		
Number of Roadwheels or Bogies per Side:	5		

• Experimental values

Mechanical Components Data	
Engine -	
Standard:	Gasoline, 160 BHP
Optional:	None
Transmission -	
Main:	Hydraulic
Optional:	None
Auxiliary:	
Suspension:	Rigid
Tracks or Wheels:	Pneumatic track or tires, 24 x 106 in. with tires 16 x 24 in.

Miscellaneous	
Primary Use:	Cargo carrier
Potential Uses:	Mount for small drill rig, push blade, or pull plow
Available:	Possibly Army surplus
Cost:	

SKETCH NOT AVAILABLE

Specifications for Vehicle No. 11-2.  
Vehicle Identification: Mexa 10 x 10

Vehicle Manufacturer: Vehicle Manufactured by Clark  
Equipment Company for the U. S. Army

General Data

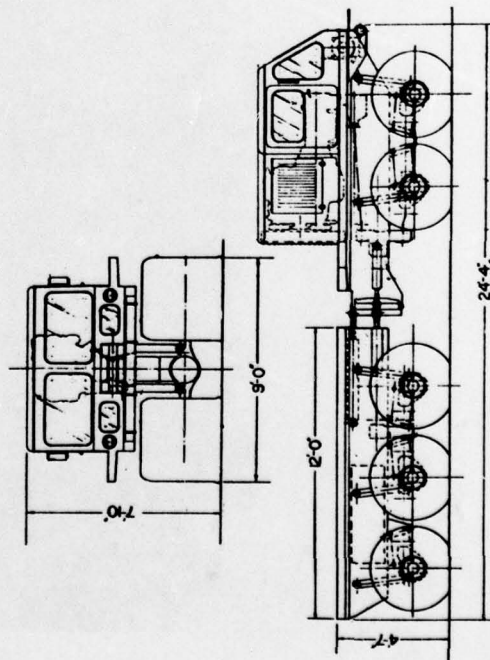
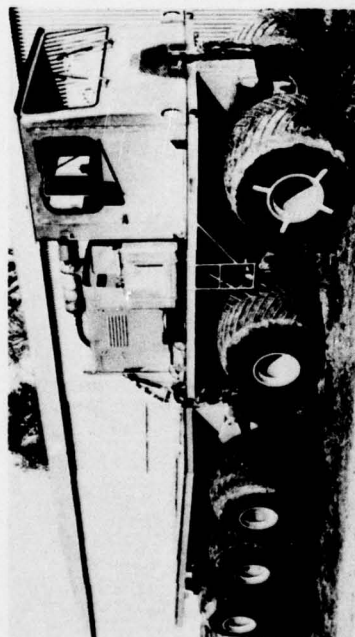
Weight - Basic:	13,020 lb	Maximum Speed - Land:	30 mph
Payload:	5,000 lb	- Water:	0 mph
Gross Weight:	18,020 lb	Ground Clearance:	11.5 in.
Ground Pressure - Empty:	2.30 psi	Fording Depth:	40 in.
- Loaded:	3.1 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	222 in.	Vehicle Core Index (1 Pass):	7
- Width:	108 in.	Vehicle Core Index (50 Pass):	18
- Height:	94 in.	Track or Tire Size:	42 x 40
Nominal Tire Diameter:	42 in.	Tire Pressure:	3 psi
Nominal Tire Width:	40 in.		

Mechanical Components Data

Engine -	Standard 214 BHP	Suspension	Air shock absorbers
Optional:	None		
Transmission -	Main Hydraulic	Tracks or Wheels:	42 x 40 4-ply Terra tires mounted on a 16-in.-diameter rim
Optional:	None		
Auxiliary:	2 speed transfer		

Miscellaneous

Primary Use:	Cargo carrier	Cost:	
Potential Uses:	Mount for small drill rig, push blade, or pull plow		
Available:	Only one made		





Specifications for Vehicle No. II-10  
Vehicle Identification: Moxa Track

Vehicle Manufacturer: Developed by Clark Equipment Company for U. S. Army

General Data

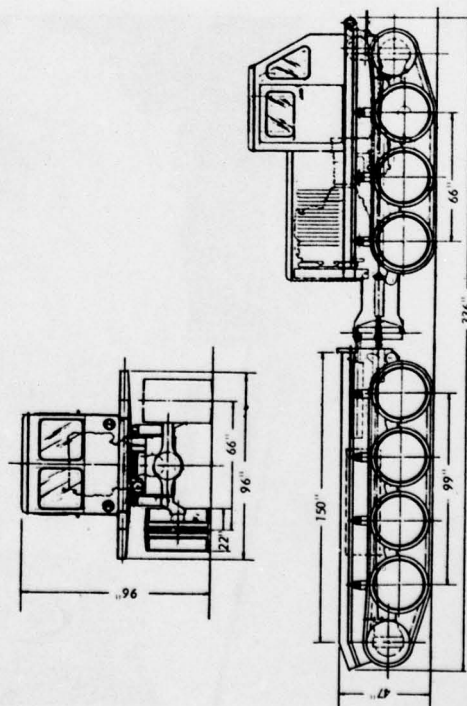
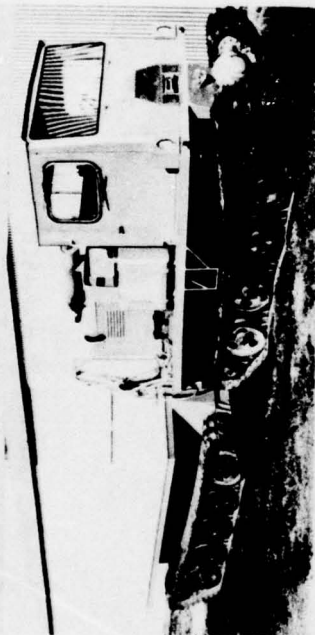
Weight - Basic:	14,680 lb	Maximum Speed - Land	30 mph
Payload:	5,000 lb	- Water:	0 mph
Gross Weight:	19,680 lb	Ground Clearance:	12.0 in.
Ground Pressure - Empty	2.02 psi	Fording Depth:	— in.
- Loaded:	2.11 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	36.6 in.	Vehicle Cone Index (1-Pass):	8
- Width:	26 in.	Vehicle Cone Index (50-Pass):	20
- Height:	26 in.	Track or Tire Size:	Two units (1) 22 x 99 in., (1) 22 x 66 in.
Grouser Height:	53.2 in.	Tire Pressure:	NA psi
Sprocket Pitch:	1 in.		
Number of Roadwheels or Bogies per Side:	7		

Mechanical Components Data

Engine -	Standard 214 BHP	Suspension:	Air shock absorbers
Optional:	None		
Transmission -	Main Hydraulic	Tracks or Wheels:	Two track units (1) 22 x 99 in. (1) 22 x 66 in.
Optional:			
Auxiliary:	2 speed transfer		

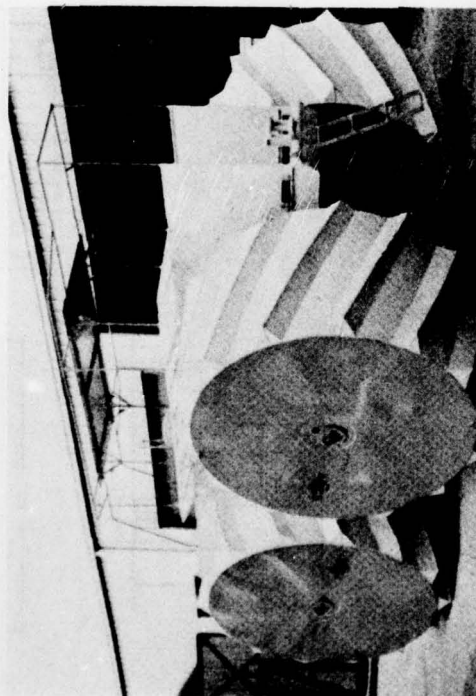
Miscellaneous

Primary Use: Cargo carrier  
Potential Uses: Mount for small drill rig, push blade, or pull plow  
Available: Only one made  
Cost: \_\_\_\_\_



Specifications for Vehicle No. 11-11  
 Vehicle Identification: Amphibious Carrier Model 104-W-HD-59

Vehicle Manufacturer: Quality Marsh International Corp.  
 P. O. Box 406  
 Thibodaux, LA 70301



General Data			
Weight - Basic	18,000 lb	Maximum Speed - Land	10 mph
Payload	4,000 lb	- Water	3-4 mph
Gross Weight	22,000 lb	Ground Clearance	54 in.
Ground Pressure - Empty	--- psi	Fording Depth	48 ft in.
- Loaded	--- psi	Maximum Slope Negotiable	60 %
Overall - Length	24.0 in.	Vehicle Cone Index (1 Pass)	0
- Width	18.3 in.	Vehicle Cone Index (50 Pass)	2
- Height	12.8 in.	Track or Tire Size: 50 in. wide x 108 in. diameter	
Nominal Tire Diameter:	108 in.		
Nominal Tire Width:	50 in.	Tire Pressure	3 psi

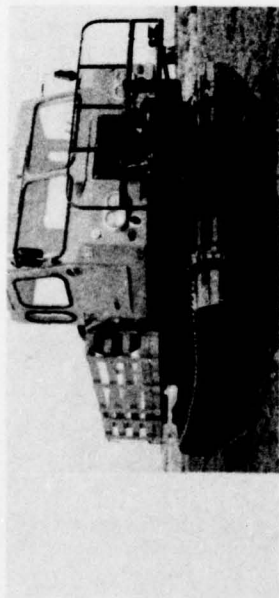
Mechanical Components Data	
Engine -	Suspension: Rigid
Standard: GM 4-53 Diesel, 252 BHP	
Optional: None	
Transmission -	Tracks or Wheels: All-steel welded construction
Main: 4 speed manual	
Optional: None	
Auxiliary: None	
Miscellaneous	
Primary Use: Cargo carrier	Cost: \$79,556
Potential Uses: Mount for small drill rig, push blade, or pull plow	
Available: Yes	

SKETCH NOT AVAILABLE

Index of Group III Vehicles, 3- to 7-1/2-Ton Payload

<u>Vehicle No.</u>	<u>Vehicle Identification</u>
III-1	FN 60
III-2	Muskeg Carrier
III-3	FN 75
III-4	Rolligon 4460
III-5	FN WT-100
III-6	FN 100 TT
III-7	FN 110
III-8	TVS 1000
III-9	Dragline Carrier Model No. 10XT-HD-59M
III-10	ROTO-BOOM Model No. 104T-65
III-11	Amphibious Carrier Model 10XT-HD-65M

Specifications for Vehicle No. III-1  
Vehicle Identification: PN 60



Vehicle Manufacturer: Flextrac Norwell, P. O. Box 5544,  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada

General Data

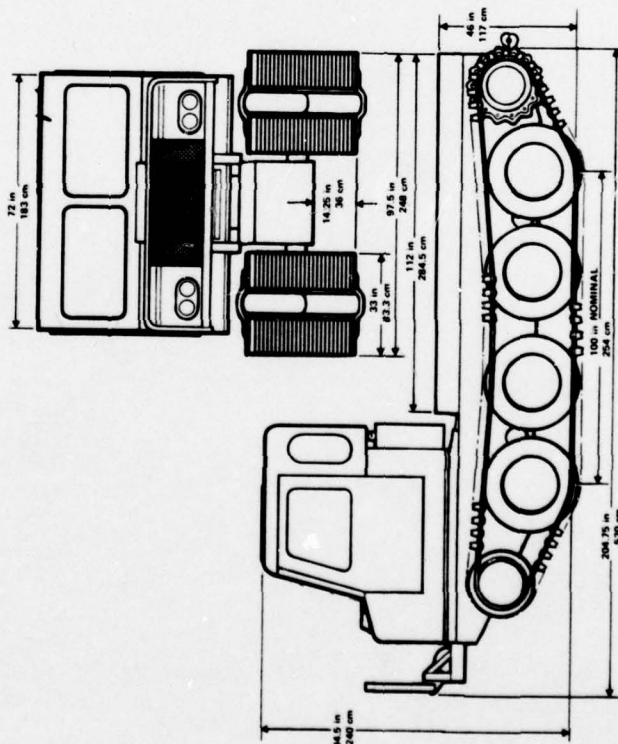
Weight - Basic:	40,400 lb	Maximum Speed - Land	16.2 mph
Payload:	6,000 lb	- Water	0 mph
Gross Weight:	46,400 lb	Ground Clearance	14.25 in.
Ground Pressure - Empty	1.58 psi	Fording Depth	4.2 in.
- Loaded:	2.48 psi	Maximum Slope Negotiable	60 %
Overall - Length	205 in.	Vehicle Cone Index (1-Pass)	4
- Width:	72 in.	Vehicle Cone Index (50-Pass)	1.5
- Height:	94.5 in.	Track or Tire Size: 33 x 100 in.	
Grouser Height	51.5 in.	Tire Pressure	30 psi
Sprocket Pitch	6.0 in.		
Number of Roadwheels or Buses per Side	4		

Mechanical Components Data

Engine -	Standard: Ford, 240 CID, 6 cylinder, 167 BHP	Suspension	Walking beams, urethane bearings.
	Optional: Diesel		
Transmission -	Main: 4 speed manual	Tracks or Wheels	Rubber bolts and drop center steel grouser.
	Optional: Automatic		
Auxiliary:			

Miscellaneous

Primary Use	Cargo carrier	Cost:	\$20,015
Potential Uses:	Mount for drill rig, push blade, or pull plow		
Available:	Yes		





Specifications for Vehicle No. III-2  
 Vehicle Identification: Muskeg Carrier

Vehicle Manufacturer: Bombardier Limited  
Industrial Division  
Valcourt, Quebec, Canada

#### General Data

Weight - Basic:	7,000 lb	Maximum Speed - Land:	14.6 mph
Payload:	8,000 lb	- Water:	0 mph
Gross Weight:	15,000 lb	Ground Clearance:	14 in.
Ground Pressure - Empty:	1.33 psi	Fording Depth:	32 in.
- Loaded:	2.85 psi	Maximum Slope Negotiable:	80 %
Overall - Length:	142.5 in.	Vehicle Cone Index (1 Pass):	7
- Width:	87 in.	Vehicle Cone Index (50 Pass):	17
- Height:	89 in.	Track or Tire Size: 28 x 94 in.	
Grouser Height:	43.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	4.5 in.		
Number of Roadwheels or Bogies per Side:	4		

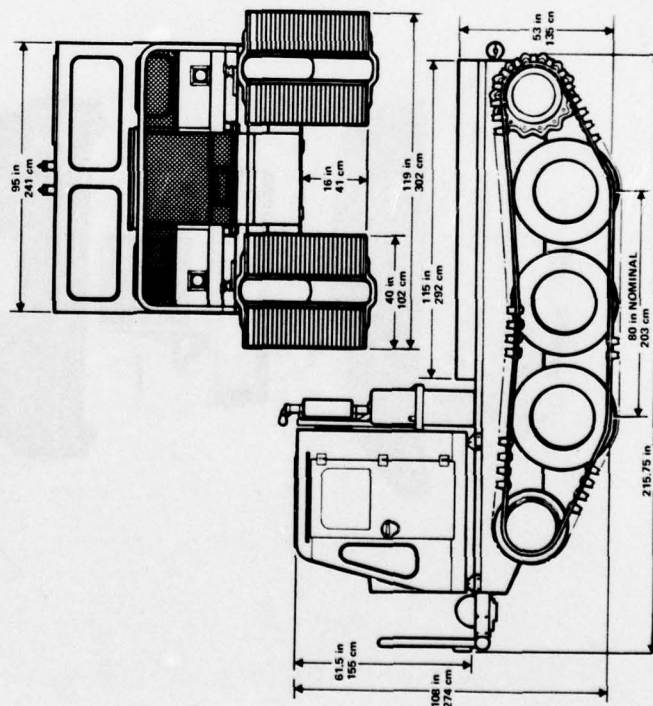
#### Mechanical Components Data

Engine -		Suspension	Tandem and rubber bushings
Standard:	Chrysler 318 CID, 187 BHP		
Optional:	Perkins diesel, 88 BHP		
Transmission -		Tracks or Wheels	Rubber and fabric with reinforcing steel wire forged spring steel cross-links
Min:	4 speed manual		
Optional:	None		
Auxiliary:	None		

#### Miscellaneous

Primary Use:	Cargo carrier	Cost:	\$15,400
Potential Uses:	Mount for drill rig, push blade, or pull plow		
Available:	Yes		

Specifications for Vehicle No. III-3  
Vehicle Identification: FN 75



Vehicle Manufacturer: Plaxtino Howell, P. O. Box 5544  
Station A 1203, 42nd Ave., SE  
Calgary, Alberta, Canada

#### General Data

Weight - Basic:	15,550 lb	Maximum Speed - Land	14.6 mph
Payload:	8,000 lb	- Water:	0 mph
Gross Weight:	23,550 lb	Ground Clearance:	16 in.
Ground Pressure - Empty	2.42 psi	Fording Depth:	4.8 in.
- Loaded	3.67 psi	Maximum Slope Negotiable	60 %
Overall - Length:	215.75 in.	Vehicle Cone Index (1-Pass):	6
- Width:	119 in.	Vehicle Cone Index (50-Pass):	15
- Height:	18 in.	Track or Tire Size: 40 x 80 in.	
Grouser Height:	51.5 in.	Tire Pressure:	30 psi
Sprocket Pitch:	6.0 in.		
Number of Roadwheels or Bogies per Side:	3		

#### Mechanical Components Data

Engine -	Suspension:
Standard: Ford, 391 CID, V-8, gasoline,	Crank arm with 57-lb torsion coil spring
Optional: Diesel	
Transmission -	Tracks or Wheels:
Main: 5 speed manual	Rubber belts and spring steel drop center grousers
Optional: Automatic	
Auxiliary: None	

#### Miscellaneous

Primary Use:	Cargo carrier	Cost:	\$28,215
Potential Uses:	Mount for drill rig, push blade, or pull plow		
Available:	Yes		

Specifications for Vehicle No. III-4  
 Vehicle Identification: Rolligon 4460

Vehicle Manufacturer: The Rolligon Corporation  
10635 Brighton Lane  
Stafford, TX 77477

General Data

Weight - Basic	7,500 lb	Maximum Speed - Land	24 mph
Payload	10,000 lb	- Water	2 mph
Gross Weight	17,500 lb	Ground Clearance	25 in.
Ground Pressure - Empty	psi	Fording Depth	AME in.
- Loaded	241 in.	Maximum Slope Negotiable	60 %
Overall - Length	155.5 in.	Vehicle Core Index (1-Pass)	2
- Width	96 in.	Vehicle Core Index (50-Pass)	22
- Height	54 in.	Track or Tire Size	54 x 68-in. Rolligon
Nominal Tire Diameter	68 in.	Tire Pressure	6 psi
Nominal Tire Width			

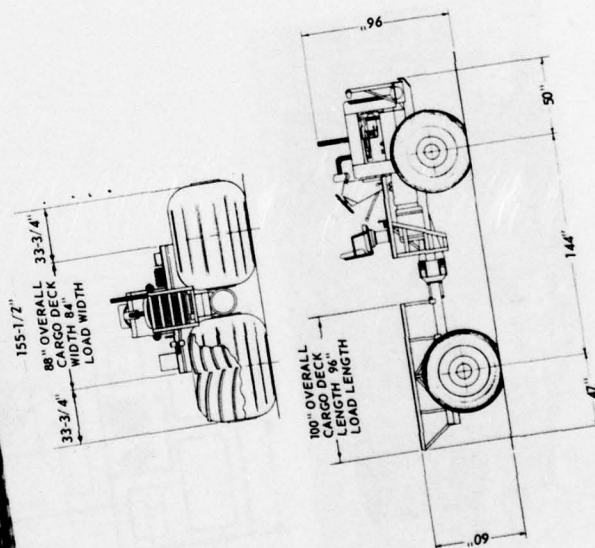
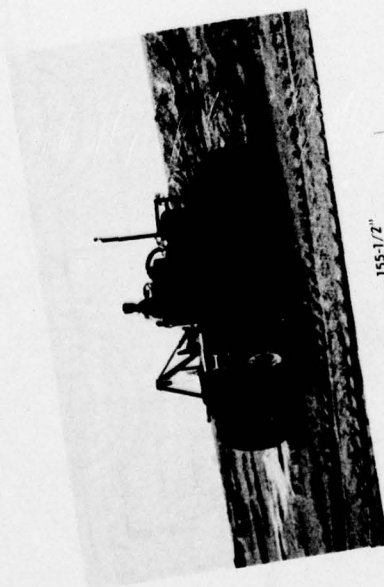
Mechanical Components Data

Engine -	Suspension: Rigid
Standard: Ford Model 362, 6 cylinder, diesel, 101 BHP	Tracks or Wheels: 54 x 68-in. cleated Rolligon tires on 38-in.-diameter rim
Optional: None	
Transmission -	
Main: 4 speed manual	
Optional: None	
Auxiliary: None	
	<u>Miscellaneous</u>
	Cost: <u>\$28,480</u>

Primary Use: Cargo carrier

Potential Uses: Mount for drill rig, push blade, or pull plow

Available: Yes





Specifications for Vehicle No. III-5  
Vehicle Identification: FN WT-100

Vehicle Manufacturer: Flextrac Rodwell, P. O. Box 5544  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada

#### General Data

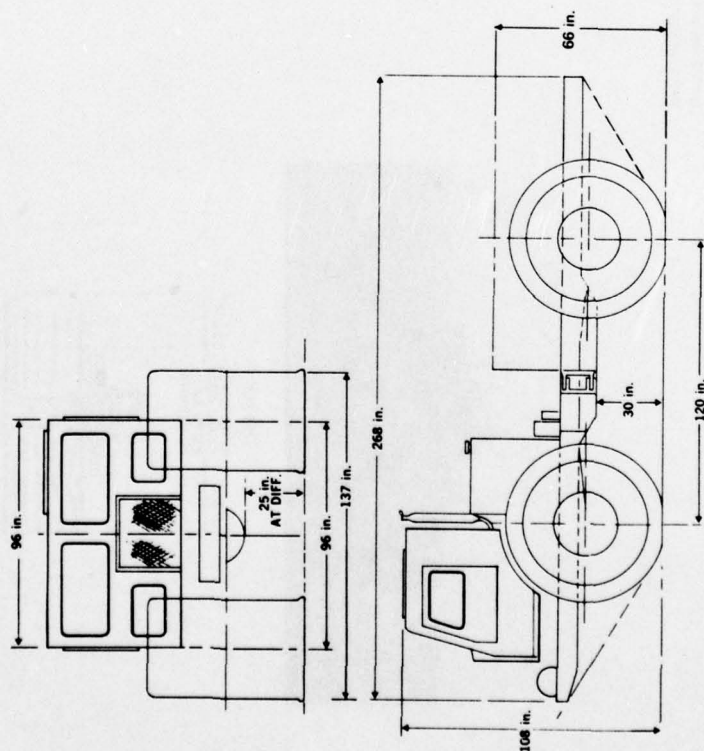
Weight - Basic:	8,500 lb	Maximum Speed - Land:	40 mph
Payload:	10,000 lb	- Water:	0 mph
Gross Weight:	22,000 lb	Ground Clearance:	25 in.
Ground Pressure - Empty:	1.45 psi	Fording Depth:	in.
- Loaded:	3.35 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	268 in.	Vehicle Cone Index (1-Pass):	10
- Width:	137 in.	Vehicle Cone Index (50-Pass):	25
- Height:	108 in.	Track or Tire Size: 66 x 43.00 Terra	
Nominal Tire Diameter:	66 in.	Tire Pressure:	5 psi
Nominal Tire Width:	43 in.		

#### Mechanical Components Data

Engine -	Suspension: Rigid
Standard: Ford, V-8, 330 CID, 150 BHP	
Optional: GM 4-53 diesel engine	
Transmission -	Tracks or Wheels: Terra tire 66 x 43.00, 6-ply mounted on 25-in. rim
Main: Clark 285V, 5 speed	
Optional: Fuller Transmission, 5 speed	
Allison QT-3341 Powershift	
Auxiliary: New process 200 series, 2 speed	

#### Miscellaneous

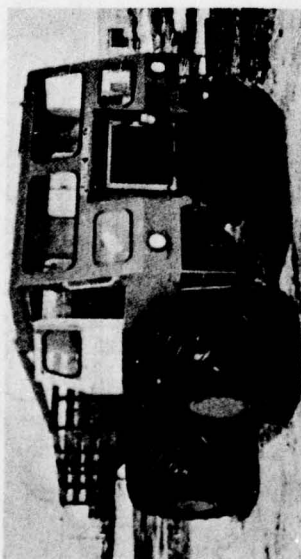
Primary Use: Cargo carrier	Cost: \$30,128
Potential Uses: Mount for drill rig, push blade, or pull plow	
Available: Yes	



A40



Specifications for Vehicle No. III-6  
Vehicle Identification: FN 100 TT



Vehicle Manufacturer: Flextrac Nodwell, P. O. Box 5544  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada

#### General Data

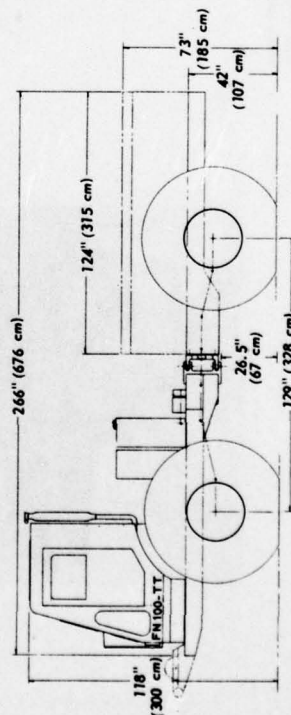
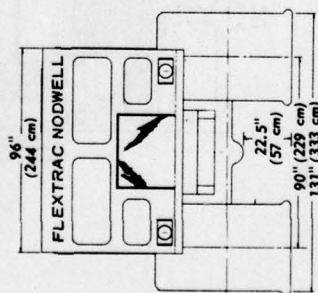
Weight - Basic:	15,000 lb	Maximum Speed - Land:	30 mph
Payload:	10,000 lb	- Water:	0 mph
Gross Weight:	25,000 lb	Ground Clearance:	22.5 in.
Ground Pressure - Empty:	2.16 psi	Fording Depth:	22 in.
- Loaded:	4.2 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	266 in.	Vehicle Cone Index (1-Pass):	1.3
- Width:	131 in.	Vehicle Cone Index (50-Pass):	31
- Height:	118 in.	Track or Tire Size: 66 x 4.3 Terra	
Nominal Tire Diameter:	66 in.	Tire Pressure:	6 psi
Nominal Tire Width:	13.3 in.		

#### Mechanical Components Data

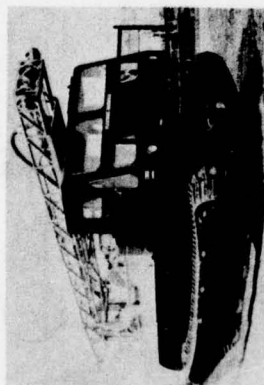
Engine -	Suspension: Rigid
Standard: Ford V-8, 391 CID, 187 BHP	
Optional: GM 4-53 diesel, 126 BHP	
Transmission -	Tracks or Wheels: 66 x 4.3 Terra tires on 25-in. rim
Main: 5 speed manual	
Optional: None	
Auxiliary: None	

#### Miscellaneous

Primary Use: Cargo carrier	Cost: \$30,728
Potential Uses: Mount for drill rig, push blade, or pull plow	
Available: Yes	



Specifications for Vehicle No. III-7  
Vehicle Identification: FN 110



Vehicle Manufacturer: Flextrac Nodwell, P. O. Box 5544  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada

General Data

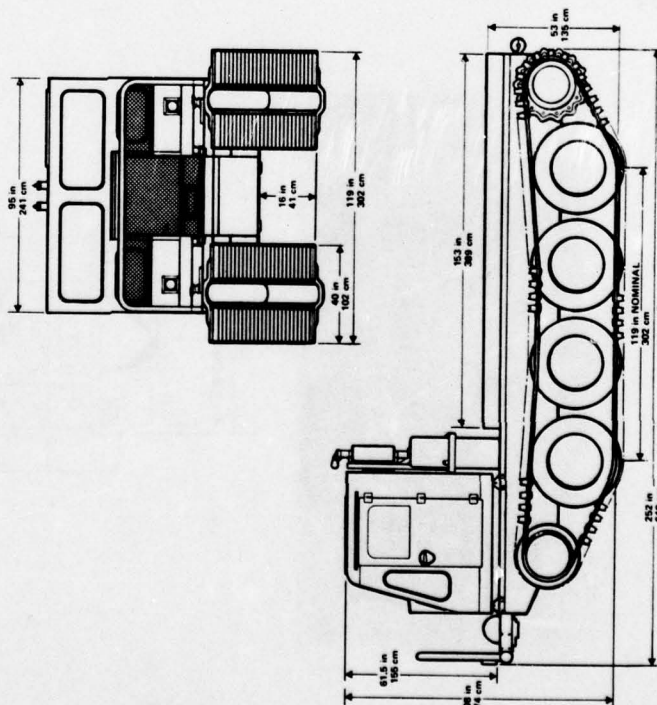
Weight - Basic:	18,200 lb	Maximum Speed - Land:	14.6 mph
Payload:	12,000 lb	- Water:	0 mph
Gross Weight:	30,200 lb	Ground Clearance:	16 in.
Ground Pressure - Empty:	1.91 psi	Fording Depth:	48 in.
- Loaded:	3.17 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	252 in.	Vehicle Cone Index (1-Pass):	6
- Width:	112 in.	Vehicle Cone Index (50-Pass):	15
- Height:	108 in.	Track or Tire Size:	40 x 119 in.
Crawler Height:	51.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	6 in.		
Number of Roadwheels or Bogies per Side:	4		

Mechanical Components Data

Engine -	Suspension:
Standard: Ford, 391 CID, gasoline, 187 BHP	Crank arm with 57-lb torsion coil spring
Optional: Diesel	
Transmission -	Tracks or Wheels:
Main: 5 speed manual	Rubber belt and apring steel drop center grouser
Optional: Automatic	
Auxiliary: None	

Miscellaneous

Primary Use:	Drill rig platform	Cost:	\$11,194
Potential Uses:	Mount for small dragline, drill rig, push blade, or pull plow		
Available:	Yes		



Specifications for Vehicle No. III-58  
Vehicle Identification TVS 1000

Vehicle Manufacturer: Foremost International Industries, Ltd.  
1616 Meridian Road, SE  
Calgary, Alberta, Canada

General Data

Weight - Basic:	18,600 lb	Maximum Speed - Land:	30 mph
Payload:	12,000 lb	- Water:	0 mph
Gross Weight:	30,600 lb	Ground Clearance:	16 in.
Ground Pressure - Empty:	3.97 psi	Fording Depth:	48 in.
- Loaded:	3.24 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	204.5 in.	Vehicle Cone Index (1-Pass):	7
- Width:	112 in.	Vehicle Cone Index (50-Pass):	17
- Height:	106 in.	Track or Tire Size:	40 x 118 in.
Grouser Height:	53.5 in.	Tire Pressure:	34 psi
Sprocket Pitch:	6 in.		
Number of Roadwheels or Bogs per Side:	4		

Mechanical Components Data

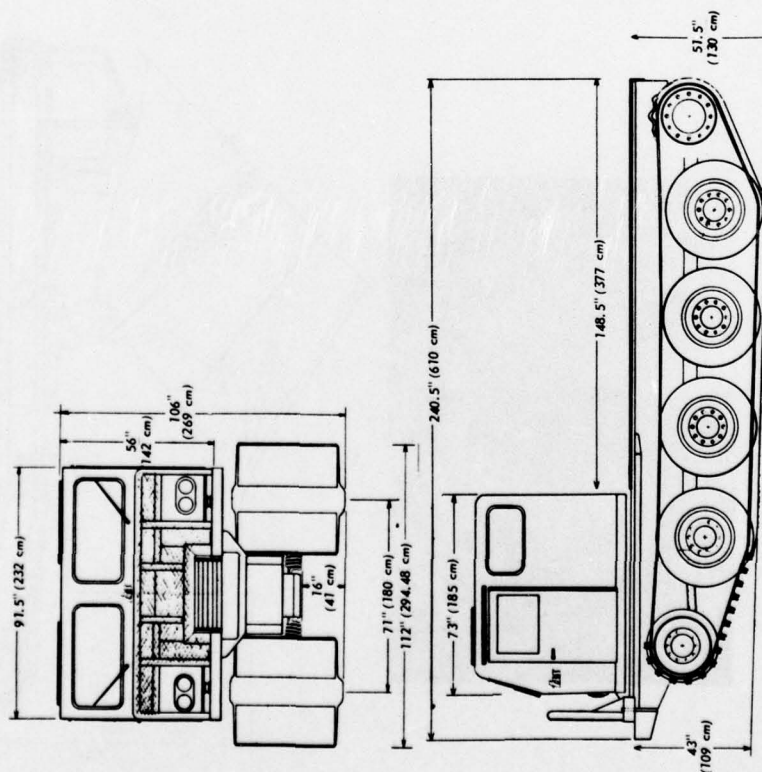
Engine -	Suspension: Heavy-duty springs
Standard: Ford 391 CID, 187 BHP	
Optional: GM 6V53, Cummins 504C	
Transmission -	Tracks or Wheels: 4-ply rayon/nylon fabric with spring steel grouzers
Main: Spicer 5 speed manual	
Optional: Fuller 5 speed manual	
Auxiliary: None	

Miscellaneous

Primary Use: Cargo carrier	Cost: \$31,252
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Potential Uses: Mount for small dragline, drill rig, push blade, or pull plow

Available: Yes



A43

Specifications for Vehicle No. III-2  
 Vehicle Identification: Dragline Carrier Model No. LOXT-HD-59K

Vehicle Manufacturer: Quality Marsh International Corp.  
 P. O. Box 406  
 Thibodaux, LA 70301

General Data

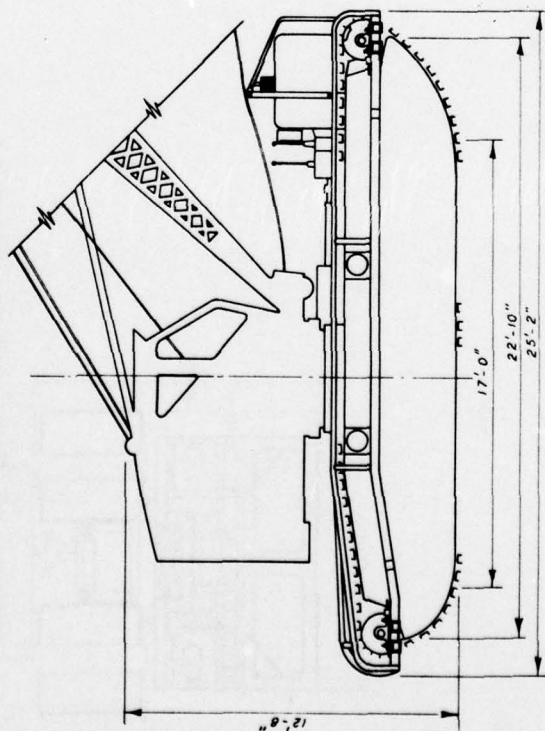
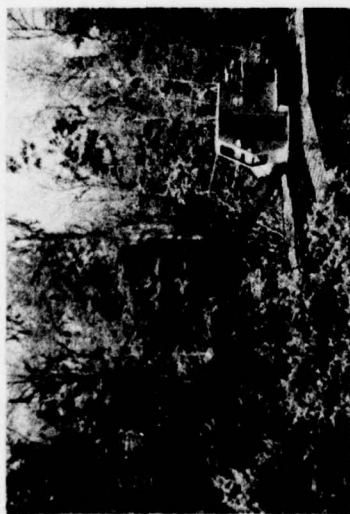
Weight - Basic:	20,000 lb	Maximum Speed - Land:	4.5 mph
Payload:	12,000 lb	- Water:	3.4 mph
Gross Weight:	32,000 lb	Ground Clearance:	38 in.
Ground Pressure - Empty:	0.82 psi	Fording Depth:	AMP in.
- Loaded:	1.31 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	302 in.	Vehicle Cone Index (1-Pass):	0
- Width:	224 in.	Vehicle Cone Index (50-Pass):	2
- Height:	152 in.	Track or Tire Size: 60 x 204 in.	
Grouser Height:	51.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	2 in.		
Number of Roadwheels or Bogies per Side:	4		

Mechanical Components Data

Engine -	Suspension:	Rigid
Standard: Ford, 206 CID, 4 cylinder, 82 BHP		
Optional: GM 3-53 diesel, 78 BHP		
Transmission -	Tracks or Wheels:	3 strands of heavy-duty track chain with 4-in. aluminum channel cleats
Main: 4 speed manual		
Optional: None		
Auxiliary: None		

Miscellaneous

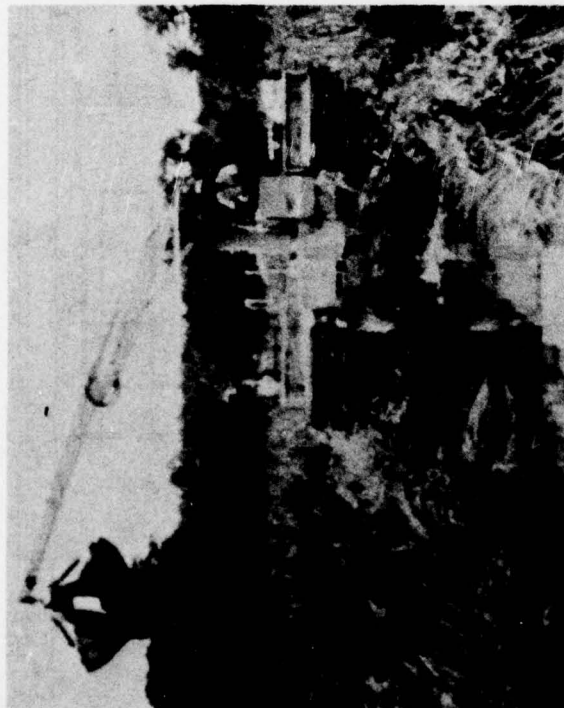
Primary Use:	Dragline carrier	Cost:	\$21,413
Potential Uses:	Mount for hydrocraue, drill rig, push blade, or pull plow		
Available:	Yes		





Specifications for Vehicle No. 111-10  
Vehicle Identification: ROTO-BOOM Model 1042-65

Vehicle Manufacturer: Quality Marsh International Corp.  
P. O. Box 406  
Milford, MA 01801



A45

#### General Data

Weight - Basic:	15,000 lb	Maximum Speed - Land:	5 mph
Payload:	3,500 lb	- Water:	3-4 mph
Gross Weight:	18,500 lb	Ground Clearance:	38 in.
Ground Pressure - Empty:	0.82 psi	Fording Depth:	AMP in.
- Loaded:	1.03 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	300 in.	Vehicle Cone Index (1-Pass):	0
- Width:	166 in.	Vehicle Cone Index (50-Pass):	2
- Height:	134 in.	Track or Tire Size:	48 x 190 in.
Grouser Height:	2 in.	Tire Pressure:	NA psi
Sprocket Pitch:	4 in.		
Number of Roadwheels or Bogies per Side:	4		

#### Mechanical Components Data

Engine -	Suspension: Rigid
Standard: Ford, 300 CID, gasoline, 165 BHP	
Optional: OM 4-53 diesel	
Transmission -	Tracks or Wheels: Two strands of heavy-duty track with clutch with 4-in. aluminum channel cleets
Main: 4 speed manual	
Optional: None	
Auxiliary: None	

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#### Miscellaneous

Primary Use: Small dragline (clam shell)	Cost:
Potential Uses: Mount for drill rig, push blade, or pull plow	
Available: Yes	

Specifications for Vehicle No. III-11  
 Vehicle Identification: Amphibious Carrier Model 10XT-BD-65M

Vehicle Manufacturer: Quality Marsh International Corp.  
 P. O. Box 406  
 Thibodaux, LA 70301

General Data

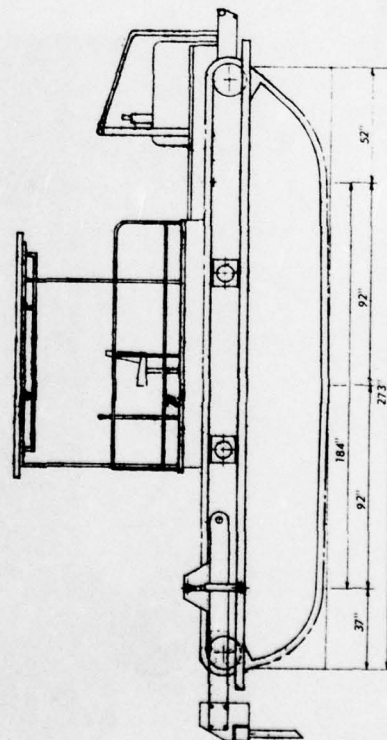
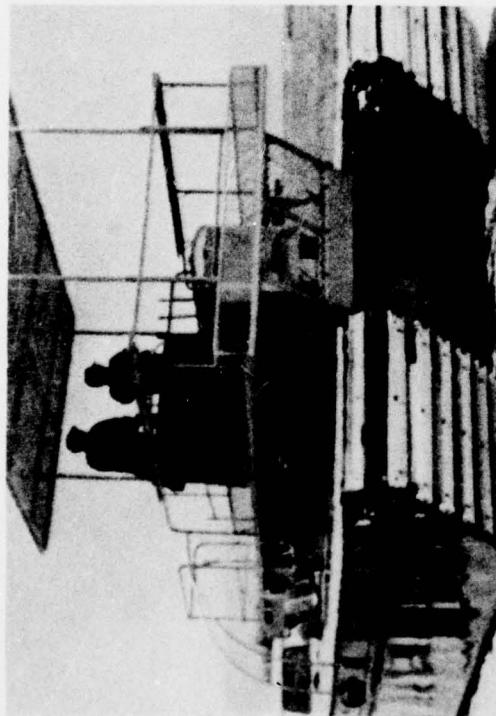
Weight - Basic:	20,000 lb	Maximum Speed - Land:	14.5 mph
Payload:	12,000 lb	- Water:	3.5 mph
Gross Weight:	32,000 lb	Ground Clearance:	4.9 in.
Ground Pressure - Empty:	0.21 psi	Fording Depth:	4.9 in.
- Loaded:	1.15 psi	Maximum Slope Negotiable:	50 %
Overall - Length:	273 in.	Vehicle Cone Index (1-Pass):	0
- Width:	219 in.	Vehicle Cone Index (50 Pass):	0
- Height:	51.5 in.	Track or Tire Size: 60 x 184 in.	0
Grouser Height:	2 in.	Tire Pressure:	NA psi
Sprocket Pitch:	4		
Number of Roadwheels or Bogies per Side:			

Mechanical Components Data

Engine -	Suspension: Rigid
Standard: Ford, 296 CID, 4 cylinder, 82 BHP	
Optional: Ford, 360 CID, 120 BHP, GM 3-53 diesel, 78 BHP	
Transmission -	Tracks or Wheels: Three strands of heavy-duty track chain with 4-in. aluminum cleats
Main: 4 speed manual	
Optional: None	
Auxiliary:	

Miscellaneous

Primary Use: Personnel or cargo carrier	Cost: \$40,000
Potential Uses: Mount for push blade, pull plow, drill rig, or radio boom.	
Available: Yes	



Index of Group IV Vehicles, 8- to 15-Ton Payload

<u>Vehicle No.</u>	<u>Vehicle Identification</u>
IV-1	FN 160
IV-2	Rolligon 6660
IV-3	FN Norcan 200
IV-4	Dawson Five
IV-5	FN 240
IV-6	Rolligon 8860
IV-7	Muskeg Tracked Transporter
IV-8	Delta Three

Specifications for Vehicle No. IV-1  
Vehicle Identification: FN 160

Vehicle Manufacturer: Electrac Rodwell, P. O. Box 5544  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada



# General Data

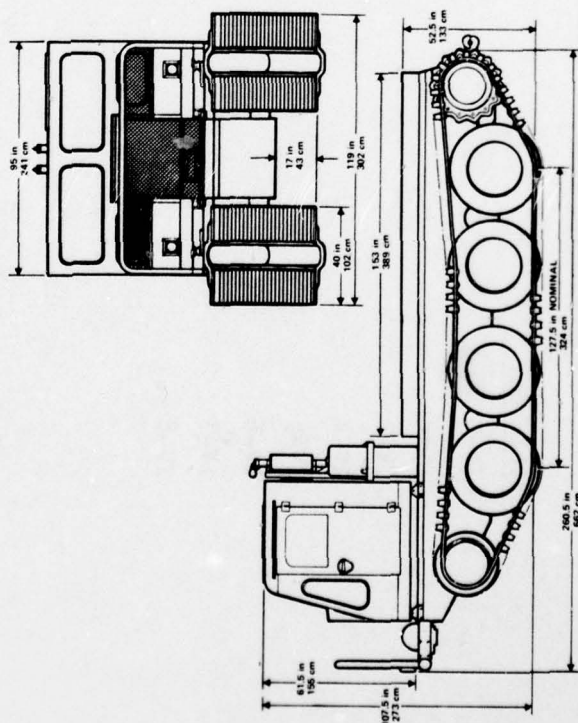
Weight - Basic:	19,200 lb	Maximum Speed - Land:	12.5 mph
Payload:	16,000 lb	- Water:	0 mph
Gross Weight:	35,200 lb	Ground Clearance:	17 in.
Ground Pressure - Empty:	3.88 psi	Fording Depth:	48 in.
- Loaded:	3.55 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	127.5 in.	Vehicle Core Index (1-Pass):	6
- Width:	112 in.	Vehicle Core Index (50-Pass):	15
- Height:	107.5 in.	Track or Tire Size:	40 x 127.5 in.
Grouser Height:	54.5 in.		
Sprocket Pitch:	66.0 in.	Tire Pressure:	NA psi
Number of Roadwheels or Bogies per Side:	4		

# Mechanical Components Data

Engine -	Suspension:
Standard: Ford, 391 CID, V-8 gasoline, 187 BHP	One-piece cast steel walking beams with urethane bearings
Optional: Diesel	
Transmission -	Tracks or Wheels:
Main: 5 speed forward	Rubber belt and spring steel drop center grousers
Optional: Automatic	
Auxiliary: None	

# Miscellaneous

Primary Use: Drill rig	Cost: \$37,174
Potential Uses: Mount for dragline, push blade, or pull plow	
Available: Yes	





Specifications for Vehicle No. IV-2  
Vehicle Identification: Rolligon 6660

Vehicle Manufacturer: The Rolligon Corporation  
10635 Brighton Lane  
Stafford, TX 77177

#### General Data

Weight - Basic:	11,000 lb	Maximum Speed - Land:	24 mph
Payload:	20,000 lb	- Water:	2 mph
Gross Weight:	31,000 lb	Ground Clearance:	21 in.
Ground Pressure - Empty:	psi	Fording Depth:	400 in.
- Loaded:	psi	Maximum Slope Negotiable:	60 %
Overall - Length:	287 in.	Vehicle Cone Inertia (1-Pass):	10
- Width:	155.5 in.	Vehicle Cone Index (50-Pass):	24
- Height:	96 in.	Track or Tire Size: 54" x 68-in. Rolligon	
Nominal Tire Diameter:	54 in.	Tire Pressure:	2 psi
Nominal Tire Width:	68 in.		

#### Mechanical Components Data

Engine -  
Standard: Ford, 380 CID, 6 cylinder,  
112 BHP, diesel  
Optional: Gasoline

Suspension: Rigid

Transmission -  
Main: 4 speed manual  
Optional: None  
Auxiliary: None

Tracks or Wheels: 54" x 68-in. Cleated Rolligon tire  
with 12-in. rim

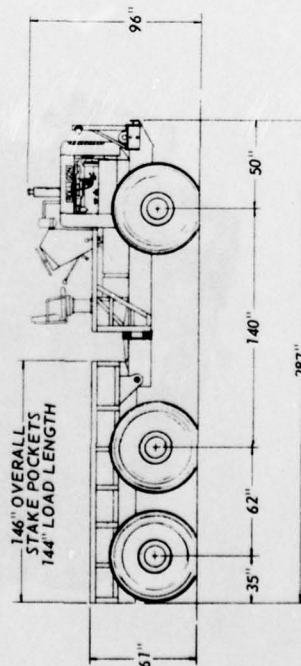
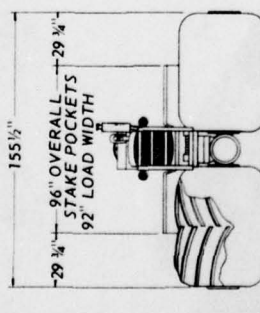
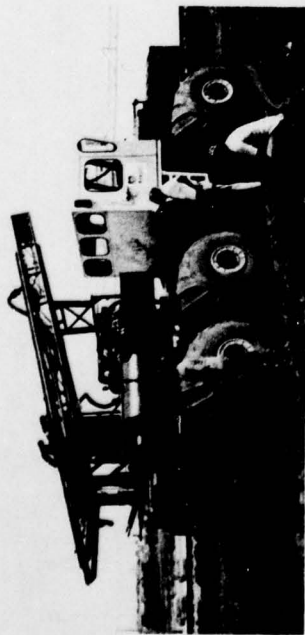
#### Miscellaneous

Primary Use: Cargo carrier

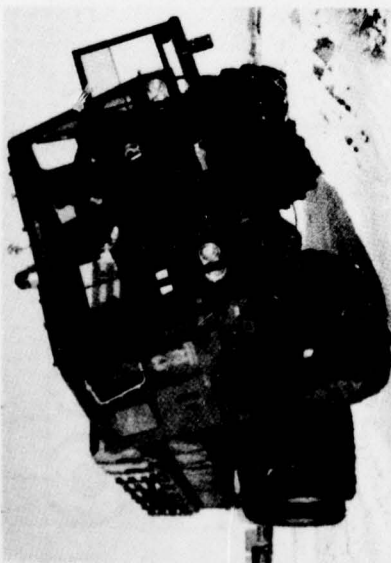
Potential Uses: Mount for dragline, drill rig, push blade, or pull plow

Available: Yes

Cost: \$79,960



Specifications for Vehicle No. IV-3  
 Vehicle Identification: FX Noreen 200



Vehicle Manufacturer: Flextac Nozwell, P. O. Box 5544  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada

#### General Data

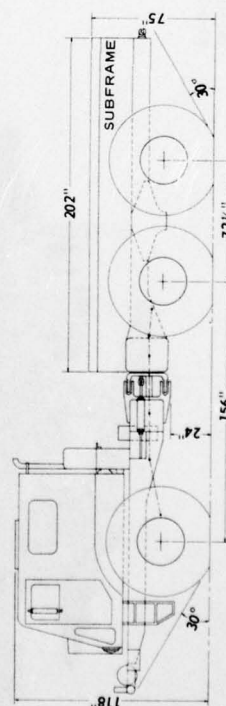
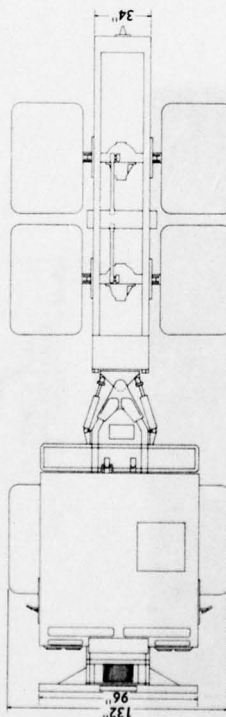
Weight - Basic:	<u>27,500</u> lb	Maximum Speed - Land:	<u>27</u> mph
Payload:	<u>20,000</u> lb	- Water:	<u>0</u> mph
Gross Weight:	<u>47,500</u> lb	Ground Clearance:	<u>19</u> in.
Ground Pressure - Empty:	<u>2.64</u> psi	Fording Depth:	<u>in.</u>
- Loaded:	<u>4.56</u> psi	Maximum Slope Negotiable:	<u>60</u> %
Overall - Length:	<u>400</u> in.	Vehicle Cone Index (1-Pass):	<u>25</u>
- Width:	<u>138</u> in.	Vehicle Cone Index (50-Pass):	<u>57</u>
- Height:	<u>119</u> in.	Track or Tire Size: <u>66 x 43-in. Terra tires</u>	
Nominal Tire Diameter:	<u>66</u> in.		
Nominal Tire Width:	<u>43</u> in.	Tire Pressure:	<u>12</u> psi

#### Mechanical Components Data

Engine -  
 Standard: Detroit diesel 6V53, 195 BHP  
 Optional: None  
 Transmission -  
 Main: Allison powershift  
 Optional: None  
 Auxiliary: None  
 Suspension: Henrichson 72.5 in. with side guide  
 Tracks or Wheels: 66 x 43-in. Terra tires on 25-in. rim

#### Miscellaneous

Primary Use: Cargo carrier Cost: \$68,483  
 Potential Uses: Mount for drill rig, dragline, push blade, or pull plow  
 Available: Yes



Specifications for Vehicle No. IV-4  
Vehicle Identification: Dawson Five

Vehicle Manufacturer: Foremont International Industries, Ltd.  
1616 Meridian Road, NE  
Calgary, Alberta, Canada

#### General Data

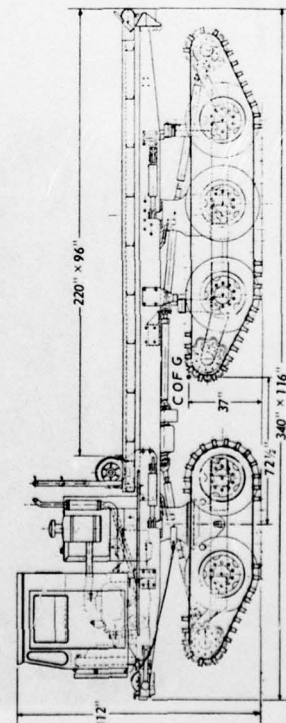
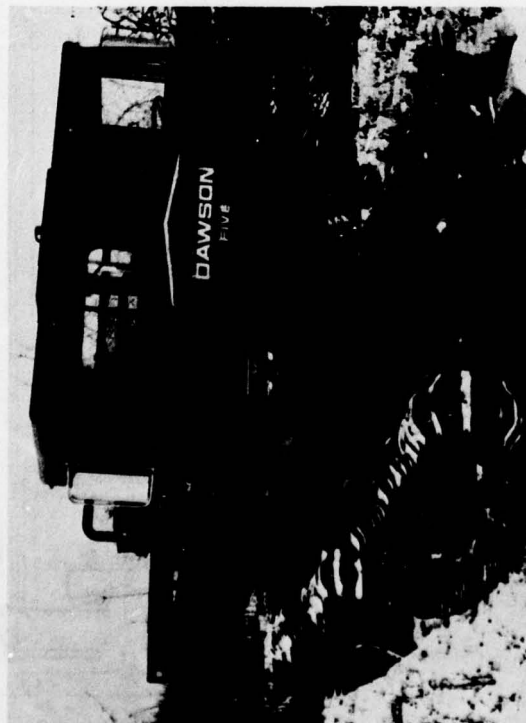
Weight - Basic:	28,000 lb	Maximum Speed - Land:	16 mph
Payload:	22,000 lb	- Water:	0 mph
Gross Weight:	50,000 lb	Ground Clearance:	17 in.
Ground Pressure - Empty:	1.97 psi	Fording Depth:	-- in.
- Loaded:	3.52 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	320 in.	Vehicle Cone Index (1-Pass):	6
- Width:	116 in.	Vehicle Cone Index (50-Pass):	15
- Height:	122 in.	Track or Tire Size:	2 units (1) 48 x 50 in., (1) 48 x 98 in.
Grouser Height:	54.5 in.	Tire Pressure:	34.5 psi
Sprocket Pitch:	7.25 in.		
Number of Roadwheels or Bogies per Side:	5		

#### Mechanical Components Data

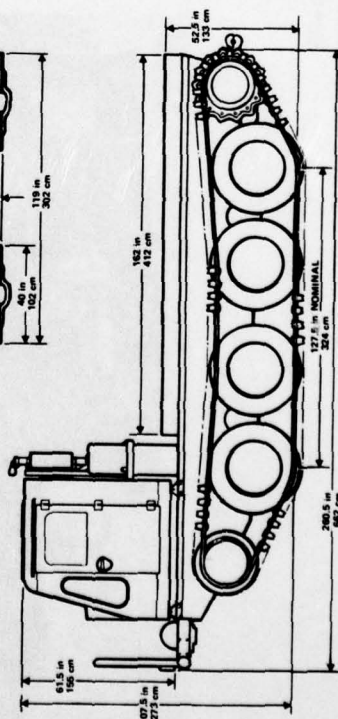
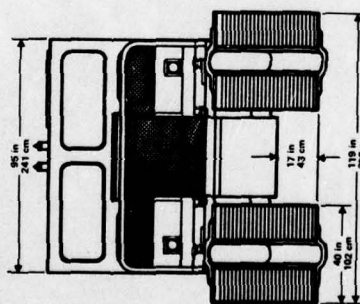
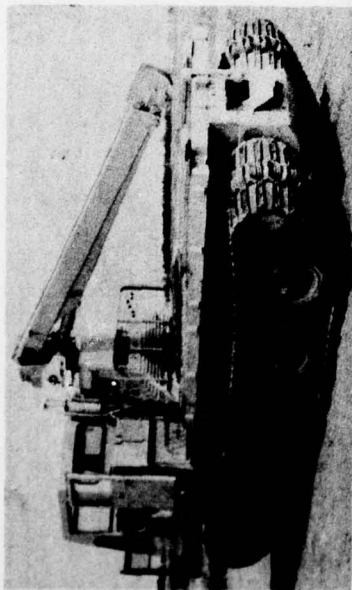
Engine -	Suspension	Heavy-duty springs
Standard: Ford, 391 CID, V-8, gasoline, 181 BHP		
Optional: Detroit diesel 6V93 Cummins diesel V8-200C		
Transmission -	Tracks or Wheels:	Rayon/nylon 6-ply with 3/8 x 3-1/2-in. grousers
Main: Spicer 5 speed manual		
Optional: Allison MF41		
Auxiliary: None		

#### Miscellaneous

Primary Use: Cargo carrier	Cost: \$24,000
Potential Uses: Mount for drill rig, dragline, push blade, or pull plow	
Available: Yes	



Specifications for Vehicle No. IV-5  
Vehicle Identification: FN 240



Vehicle Manufacturer: Flextrac Model 1, P. O. Box 5544  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada

#### General Data

Weight - Basic:	19,800 lb	Maximum Speed - Land:	12.5 mph
Payload:	24,000 lb	- Water:	0 mph
Gross Weight:	43,800 lb	Ground Clearance:	17 in.
Ground Pressure - Empty:	1.94 psi	Fording Depth:	4.6 in.
- Loaded:	4.29 psi	Maximum Slope Negotiable:	50 %
Overall - Length:	260.5 in.	Vehicle Cone Index (1-Pass):	7
- Width:	119 in.	Vehicle Cone Index (50-Pass):	17
- Height:	107.5 in.	Track or Tire Size:	40 x 127.5 in.
Grouser Height:	4.5 in.	Tire Pressure:	30 psi
Sprocket Pitch:	6.0 in.		
Number of Roadwheels or Bogies per Side:	4		

#### Mechanical Components Data

Engine - Standard: Ford, 301 CID, V-8, gasoline,  
187 BHP  
Optional: Diesel

Transmission - Main: 5 speed manual  
Optional: Automatic  
Auxiliary: None

Suspension: One-piece cast steel walking beams with  
urethane bearings

Tracks or Wheels: Rubber belt and spring steel drop  
center grouser with reinforcing bars

#### Miscellaneous

Primary Use: Cargo carrier with robo boom Cost: \$38,190

Potential Uses: Mount for drill rig, dragline, push blade, or pull plow

Available: Yes



Specifications for Vehicle No. JIV-6  
Vehicle Identification: Rolligon 8860

Vehicle Manufacturer: The Rolligon Corporation  
10635 Brighton Lane  
Stafford, TX 77477

General Data

Weight - Basic:	16,000	lb	Maximum Speed - Land:	24	mph
Payload:	30,000	lb	- Water:	2	mph
Gross Weight:	46,000	lb	Ground Clearance:	27	in.
Ground Pressure - Empty:		psi	Fording Depth:	400	in.
- Loaded:		psi	Maximum Slope Negotiable:	60	%
Overall - Length:	373	in.	Vehicle Cone Index (1-Pass):	10	
- Width:	155.5	in.	Vehicle Cone Index (50-Pass):	24	
- Height:	118	in.	Track or Tire Size: 54-in.-diameter x 68-in.-wide		
Nominal Tire Diameter:	54	in.	Rolligon		
Nominal Tire Width:	68	in.	Tire Pressure:	2	psi

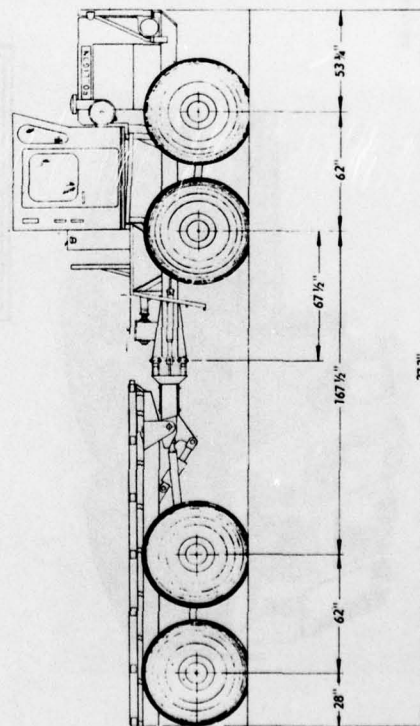
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Mechanical Components Data

Engine -	Suspension: Rigid
Standard: Ford, Model 401T, 6 cylinder diesel engine	
Optional: None	
Transmission -	Tracks or Wheels: 54-in.-diameter x 68-in.-wide cleated Rolligon tire mounted on aluminum rim
Main: Automatic powershift	
Optional: None	
Auxiliary: None	

Miscellaneous

Primary Use: Cargo carrier	Cost: \$53,610
Potential Uses: Mount for dragline, drill rig, push blade, or pull plow	
Available: Yes	



Specifications for Vehicle No. IV-7  
Vehicle Identification: Muskeg Tracked Transporter

Vehicle Manufacturer: Bombardier Limited  
Industrial Division  
Valcourt, Quebec, Canada

General Data

Weight - Basic:	24,000 lb	Maximum Speed - Land:	15 mph
Payload:	30,000 lb	- Water:	0 mph
Gross Weight:	54,000 lb	Ground Clearance:	19 in.
Ground Pressure - Empty:	1.76 psi	Fording Depth:	52 in.
- Loaded:	3.97 psi	Maximum Slope Negotiable:	75 %
Overall - Length:	24.4 in.	Vehicle Cone Index (1-Pass):	8
- Width:	130 in.	Vehicle Cone Index (50-Pass):	20
- Height:	31.6 in.	Track or Tire Size:	41 x 166 in.
Grouser Height:	53.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	6.25 in.		
Number of Roadwheels or Bogies per Side:	5		

Mechanical Components Data

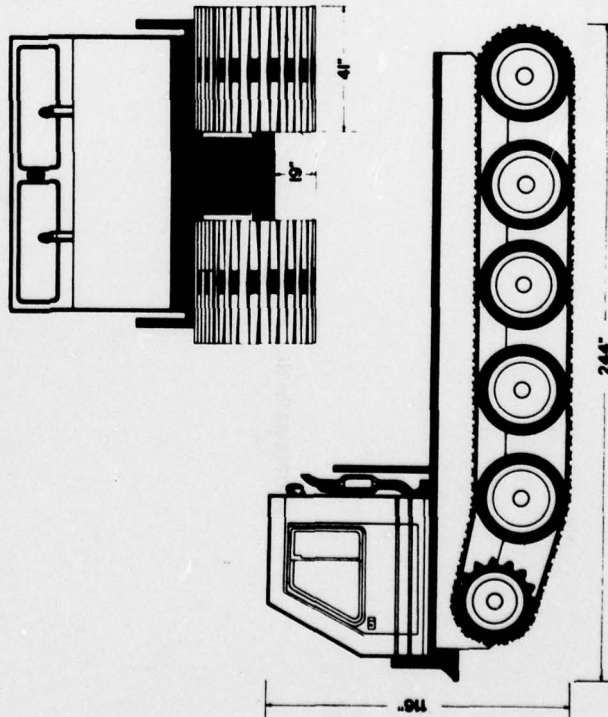
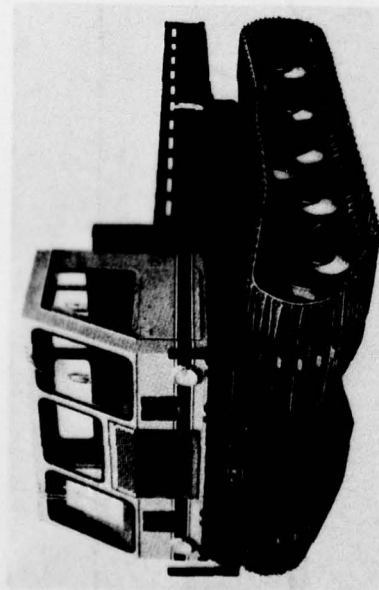
Engine -	Suspension:
Standard: GM 6V-53, diesel, 195 BHP	Crank arm with hollow rubber spring
Optional: None	
Transmission -	Tracks or Wheels:
Main: Allison Torquematic MT650, 5 speed manual	Rubber and fabric belt reinforced with steel wire with cross-links of spring steel
Optional: None	
Auxiliary: 2 speed	

Miscellaneous

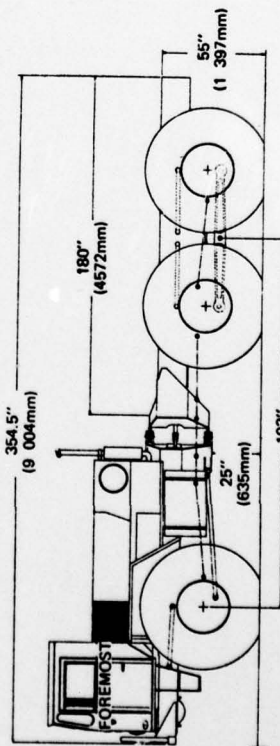
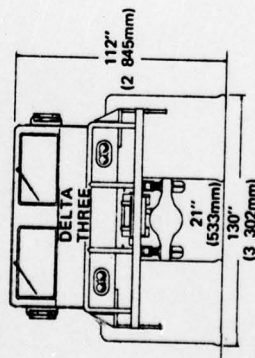
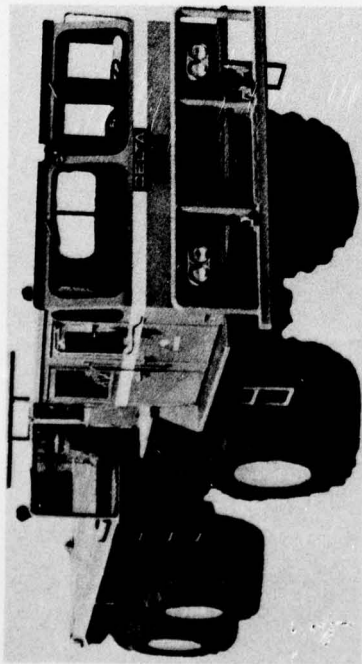
Primary Use: Cargo carrier Cost: \$60,500

Potential Uses: Mount for dragline, drill rig, push blade, or pull plow

Available: Yes



Specifications for Vehicle No. IV-3  
Vehicle Identification: Delta Three



Vehicle Manufacturer: Foremost International Industries, Ltd.  
1016 Meridian Road, NE  
Calgary, Alberta, Canada

#### General Data

Weight - Basic:	28,000 lb	Maximum Speed - Land:	30 mph
Payload:	30,000 lb	- Water:	---
Gross Weight:	58,000 lb	Ground Clearance:	21 in.
Ground Pressure - Empty:	---	Fording Depth:	---
- Loaded:	---	Maximum Slope Negotiable:	60 %
Overall - Length:	44.2 in.	Vehicle Cone Index (1-Pass):	18
- Width:	130 in.	Vehicle Cone Index (50-Pass):	42
- Height:	112 in.	Track or Tire Size: 66 x 43-in. Terra	
Nominal Tire Diameter:	66 in.	Tire Pressure:	3 psi
Nominal Tire Width:	43 in.		

#### Mechanical Components Data

Engine -	Suspension: Coil springs
Standard: Cummins V-504C, 190 BHP	
Optional: 6V-53 Detroit diesel	
Transmission -	Tracks or Wheels: 66- x 43-in., 6-ply Terra tires mounted on 25-in. rims
Main: 4 speed powershift	
Optional: None	
Auxiliary: None	

#### Miscellaneous

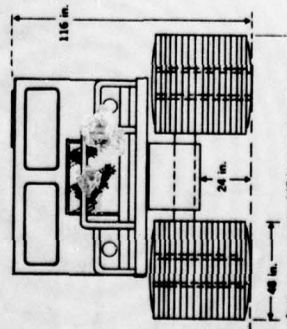
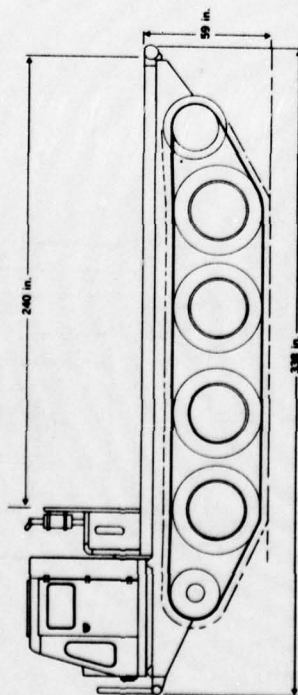
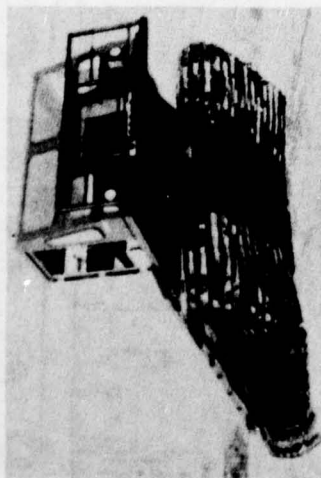
Primary Use: Cargo carrier	Cost: \$63,400
Potential Uses: Mount for dragline, drill rig, push blade, or pull plow	
Available: Yes	

Index of Group V Vehicles, >15-Ton Payload

<u>Vehicle No.</u>	<u>Vehicle Identification</u>
V-1	FN 360
V-2	Super Yukon
V-3	Dawson Seven
V-4	FN 400
V-5	Musk-Ox
V-6	FN 600
V-7	Husky 8
V-8	Dragline Carrier Model 16XT-HD-2E-73



Specifications for Vehicle No. Y-1  
Vehicle Identification: FN 360



A57

Vehicle Manufacturer: Flextrac Notwell, P. O. Box 5544  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada

#### General Data

Weight - Basic:	32,000 lb	Maximum Speed - Land:	10.4 mph
Payload:	36,000 lb	- Water:	0 mph
Gross Weight:	68,000 lb	Ground Clearance:	24 in.
Ground Pressure - Empty:	2.01 psi	Fording Depth:	56 in.
- Loaded:	4.27 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	338 in.	Vehicle Cone Index (1 Pass):	8
- Width:	115 in.	Vehicle Cone Index (50 Pass):	20
- Height:	116.5 in.	Track or Tire Size:	48 x 166 in.
Grouser Height:	54.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	64.0 in.		
Number of Roadwheels or Bogies per Side:	1		

#### Mechanical Components Data

Engine - Standard: Ford, 534 CID, V-8, 266 BHP  
Optional: Diesel

Transmission - Main: 5 speed manual  
Optional: Automatic  
Auxiliary: None

Suspension: Steel walking beams with urethane bearings

Tracks or Wheels: Rubber belts and spring steel flat  
grousers with cast modular iron  
guides

#### Miscellaneous

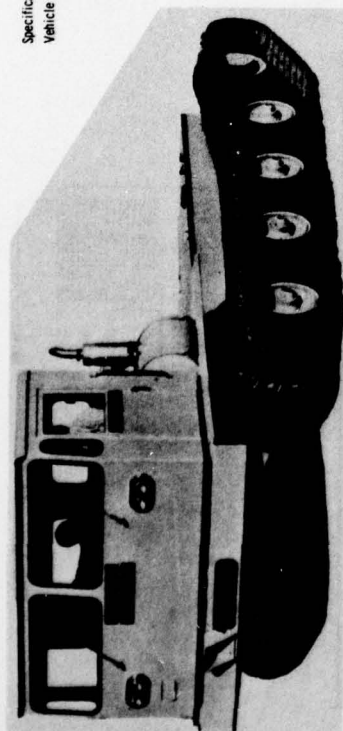
Primary Use: Cargo carrier

Potential Uses: Mount for drill rig, dragline, push blade, or pull plow

Available: Yes

Cost: \$61,045

Specifications for Vehicle No. Y-2  
Vehicle Identification: Super Yukon



Vehicle Manufacturer: Foremost International Industries, Ltd.  
1616 Meridian Road, NE  
Calgary, Alberta, Canada

#### General Data

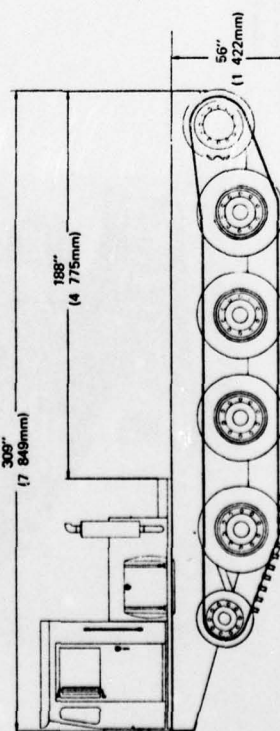
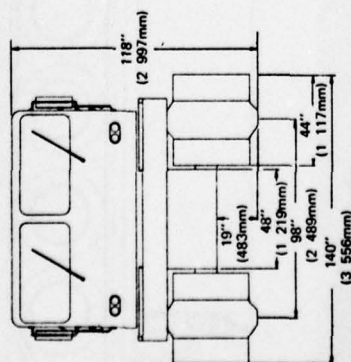
Weight - Basic:	31,000 lb	Maximum Speed - Land:	10 mph
Payload:	35,000 lb	- Water:	0 mph
Gross Weight:	67,000 lb	Ground Clearance:	19 in.
Ground Pressure - Empty:	2.28 psi	Fording Depth:	-- in.
- Loaded:	4.92 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	302 in.	Vehicle Cone Index (1-Pass):	9
- Width:	140 in.	Vehicle Cone Index (50-Pass):	22
- Height:	118 in.	Track or Tire Size:	42 x 162 in.
Grouser Height:	51.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	6.0 in.		
Number of Roadwheels or Bogies per Side:	4		

#### Mechanical Components Data

Engine -	Standard: GM 6V53, 190 BHP	Suspension:	Individual torsional coil spring on each wheel
Optional:	None		
Transmission -	Main: Power shift 4 speed	Tracks or Wheels:	42 x 162-in. track with 7/16 x 4-in. steel grousers
Optional:	None		
Auxiliary:	None		

#### Miscellaneous

Primary Use:	Cargo carrier	Cost:	\$74,900
Potential Uses:	Mount for drill rig, dragline, push blade, or pull plow		
Available:	Yes		



Specifications for Vehicle No. Y-3  
Vehicle Identification: Dawson Seven

Vehicle Manufacturer: Foremost International Industries, Ltd.  
1616 Meridian Road, SE  
Calgary, Alberta, Canada

#### General Data

Weight - Basic:	34,500 lb	Maximum Speed - Land:	16 mph
Payload:	40,000 lb	- Water:	0 mph
Gross Weight:	74,500 lb	Ground Clearance:	17 in.
Ground Pressure - Empty:	1.68 psi	Fording Depth:	in.
- Loaded:	3.63 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	38 1/2 in.	Vehicle Core Index (1-Pass):	6
- Width:	11 1/2 in.	Vehicle Core Index (50-Pass):	15
- Height:	122 in.	Track or Tire Size:	2 units (1) 48 x 86 in., (1) 48 x 128 in.
Grouser Height:	≤ 1.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	6.0 in.		
Number of Roadwheels or Bogies per Side:	7		

#### Mechanical Components Data

Engine -  
Standard: Cummins VS-504C, 210 BHP  
Optional: Detroit diesel 6V53

Transmission -  
Main: Spicer 5 speed manual  
Optional: None  
Auxiliary: None

Suspension: Heavy-duty springs

Tracks or Wheels: Rayon/nylon fabric with 5/6 x 3-1/3-in. grousers

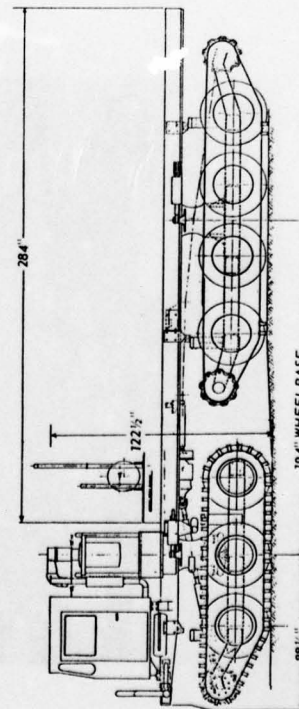
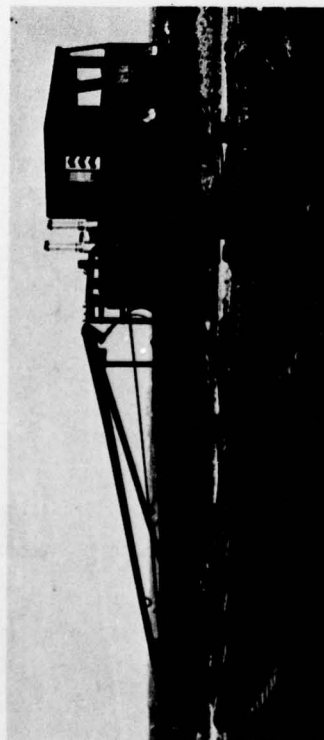
#### Miscellaneous

Primary Use: Cargo carrier

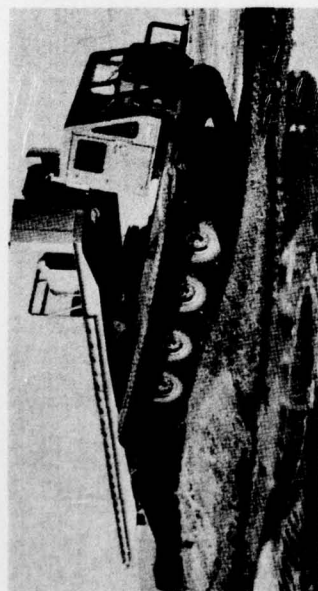
Potential Uses: Mount for dragline, drill rig, push blade, or pull plow

Available: Yes

Cost: \$24,303



Specifications for Vehicle No. V-4  
Vehicle Identification: FN 400



Vehicle Manufacturer: Flextrac Rodwell, P. O. Box 55944,  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada

#### General Data

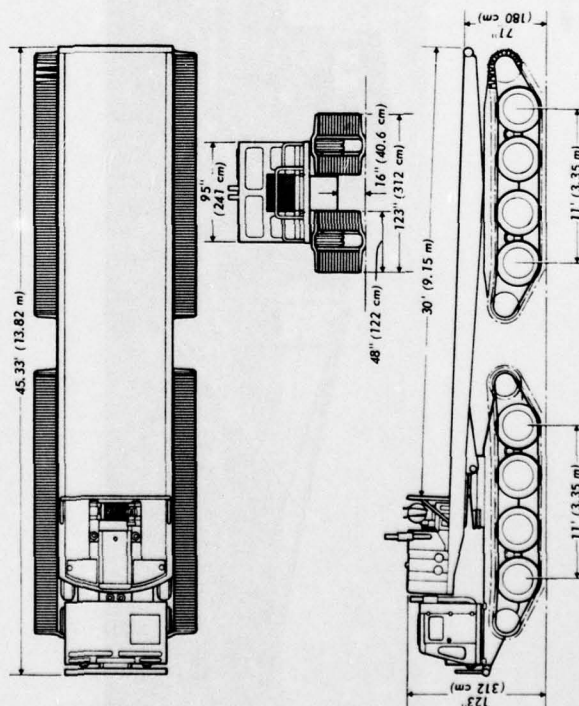
Weight - Basic:	54,000 lb	Maximum Speed - Land:	10.8 mph
Payload:	10,000 lb	- Water:	0 mph
Gross Weight:	84,000 lb	Ground Clearance:	16 in.
Ground Pressure - Empty:	2.32 psi	Fording Depth:	46 in.
- Loaded:	3.62 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	54.4 in.	Vehicle Core Index (1-Pass):	6
- Width:	32.3 in.	Vehicle Core Index (50-Pass):	12
- Height:	12.3 in.	Track or Tire Size: 2 - 48 x 121 in.	
Grouser Height:	51.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	6.0 in.		
Number of Roadwheels or Bogies per Side:	8		

#### Mechanical Components Data

Engine -	Suspension: Crank arm with torsion coil spring
Standard: (2) GM 4-53, 212 CID, 4 cylinder diesel	
Optional: None	
Transmission -	Tracks or Wheels: Rubber belt and spring steel drop center grouseers
Main: (2) semi-automatic 4 speed	
Optional: None	
Auxiliary: None	

#### Miscellaneous

Primary Use: Cargo carrier	Cost: \$110,878
Potential Uses: Mount for dragline, drill rig, push blade or pull plow	
Available: Yes	



A60



Specifications for Vehicle No. V-5  
Vehicle Identification: Musk-Ox

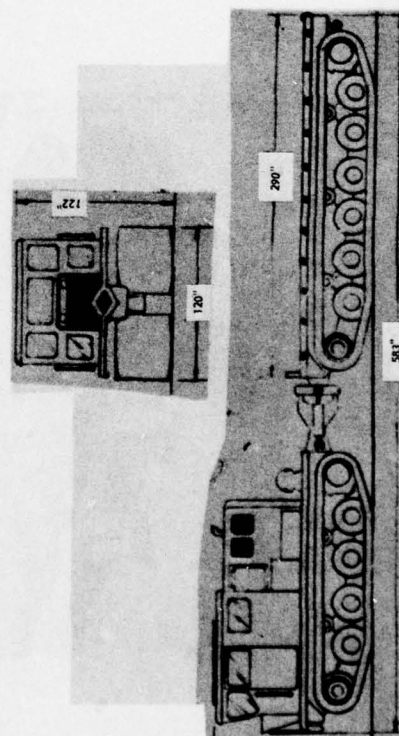
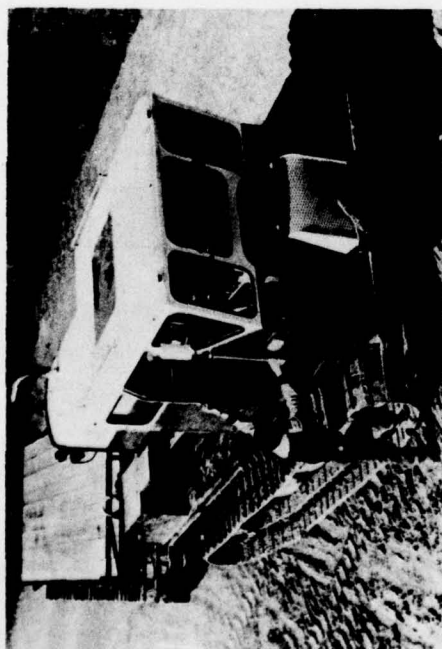
Vehicle Manufacturer: Manufactured for the U. S. Army

General Data			
Weight - Basic:	50,000 lb	Maximum Speed - Land:	15 mph
Payload:	40,000 lb	- Water:	0 mph
Gross Weight:	90,000 lb	Ground Clearance:	28 in.
Ground Pressure - Empty:	3.74 psi	Fording Depth:	in.
- Loaded:	3.11 psi	Maximum Slope Negotiable:	90 %
Overall - Length:	583 in.	Vehicle Cone Index (1-Pass):	5
- Width:	120 in.	Vehicle Cone Index (50-Pass):	13
- Height:	122 in.	Track or Tire Size: Front unit 52 x 105 in. Rear unit 52 x 165 in.	
Grouser Height:	41.5 in.	Tire Pressure:	34 psi
Sprocket Pitch:	7.15 in.		
Number of Roadwheels or Bogies per Side:	10		

#### Mechanical Components Data

Engine -	Suspension	Walking beam
Standard: Cummins, diesel, 375 BHP		
Optional: None		
Transmission -	Tracks or Wheels:	Nylon/nylon rubber belts with cast manganese steel track shoes
Main: Allison Torqueomatic		
Optional: None		
Auxiliary: None		

Miscellaneous	
Primary Use: Cargo carrier	Cost: _____
Potential Uses: Mount for dragline, drill rig, push blade, or pull plow	
Available: Possibly on surplus	



AD-A058 501

ARMY ENGINEER WATERWAYS EXPERIMENT STATION VICKSBURG MISS F/G 13/6  
ASSESSMENT OF LOW-GROUND-PRESSURE EQUIPMENT FOR USE IN CONTAINM--ETC(U)

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Specifications for Vehicle No. V-6  
Vehicle Identification: FN 600

Vehicle Manufacturer: Flextrac Rodwell, P. O. Box 5944  
Station A, 1201 42nd Ave., SE  
Calgary, Alberta, Canada

# General Data

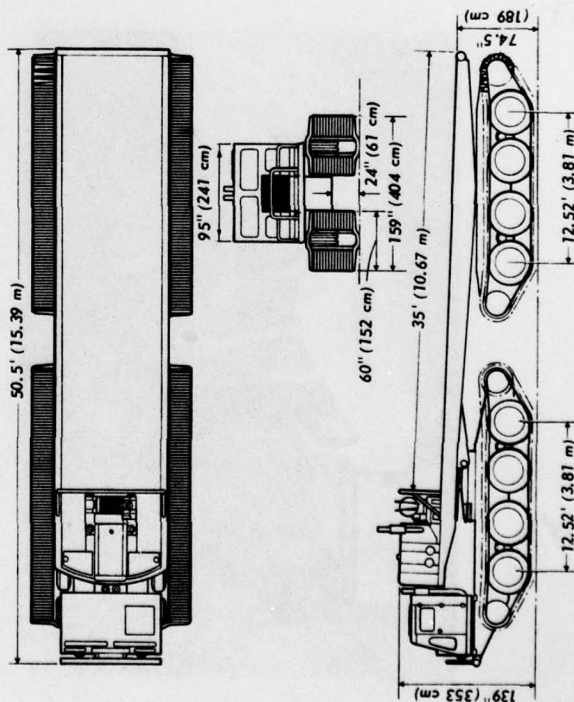
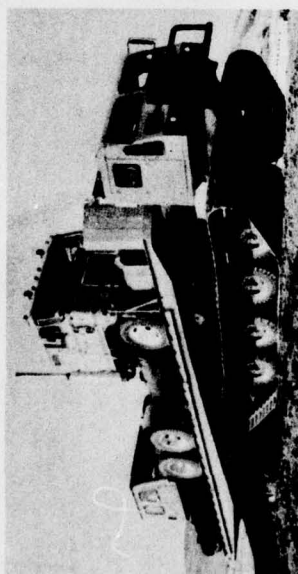
Weight - Basic:	83,000 lb	Maximum Speed - Land:	9.2 mph
Payload:	60,000 lb	- Water:	0 mph
Gross Weight:	143,000 lb	Ground Clearance:	24 in.
Ground Pressure - Empty:	2.31 psi	Fording Depth:	16 in.
- Loaded:	3.97 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	606 in.	Vehicle Core Index (1-Pass):	7
- Width:	352 in.	Vehicle Core Index (50-Pass):	17
- Height:	332 in.	Track or Tire Size: 2 sections 60 x 150 in.	
Grouser Height:	<3.5 in.	Tire Pressure:	NA psi
Sprocket Pitch:	6.0 in.		
Number of Roadwheels or Bogies per Side:	8		

# Mechanical Components Data

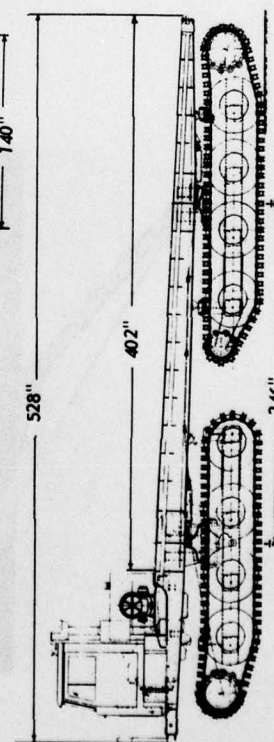
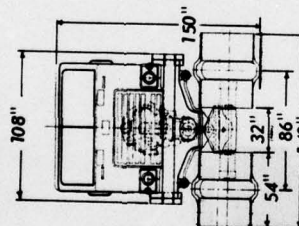
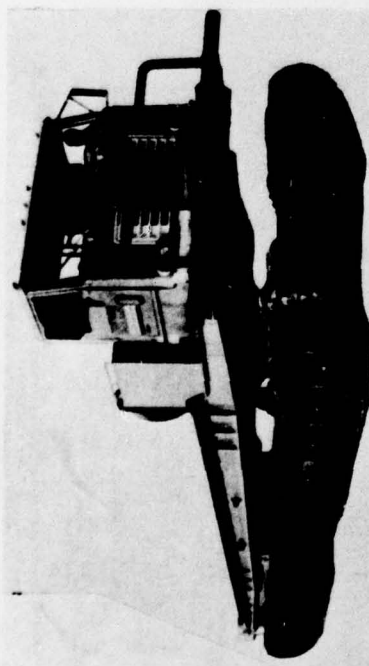
Engine -		Suspension:	One-piece cast walking beams with urethane bearings
Standard:	(2) GM 6V-53, 318 CID, diesel	Tracks or Wheels:	Rubber belt and flat grouzers
Optional:	None		
Transmission -			
Main:	(2) semi-automatic 4 speed		
Optional:			
Auxiliary:	None		

# Miscellaneous

Primary Use:	Cargo carrier	Cost:	\$16,110
Potential Uses:	Mount for dragline, drill rig, push blade, or pull plow		
Available:	Yes		



Specifications for Vehicle No. V-7  
Vehicle Identification: Busky 8



A63

Vehicle Manufacturer: Foremost International Industries, Ltd.  
1010 Meridian Road, NE  
Calgary, Alberta, Canada

#### General Data

Weight - Basic:	90,000 lb	Maximum Speed - Land:	12.5 mph
Payload:	80,000 lb	- Water:	0 mph
Gross Weight:	170,000 lb	Ground Clearance:	16 in.
Ground Pressure - Empty:	2.98 psi	Fording Depth:	-- in.
- Loaded:	5.62 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	528 in.	Vehicle Core Index (1-Pass):	2
- Width:	130 in.	Vehicle Core Index (50-Pass):	22
- Height:	150 in.	Track or Tire Size:	2 units each 54 x 140 in.
Grouser Height:	54.5 in.		
Sprocket Pitch:	6.0 in.	Tire Pressure:	NA psi
Number of Roadwheels or Bogies per Side:	8		

#### Mechanical Components Data

Engine -	Suspension: Coil springs and crank levers
Standard: Cummins NT, 855 BHP, 318 CID	
Optional: Detroit 8V71	
Transmission -	Tracks or Wheels: Heavy-duty nylon rubber belt with spring steel grouser bars
Main: Automatic 12 speed	
Optional: None	
Auxiliary: None	

#### Miscellaneous

Primary Use: Cargo carrier	Cost: \$147,290
Potential Uses: Mount for dragline, drill rig, push blade, or pull plow.	
Available: Yes	



Specifications for Vehicle No. 1-8  
 Vehicle Identification: Dragline Carrier Model 16XT-HD-2B-73

Vehicle Manufacturer: Quality Marsh International Corp.  
 P. O. Box 406  
 Philbourn, IA 70301

General Data

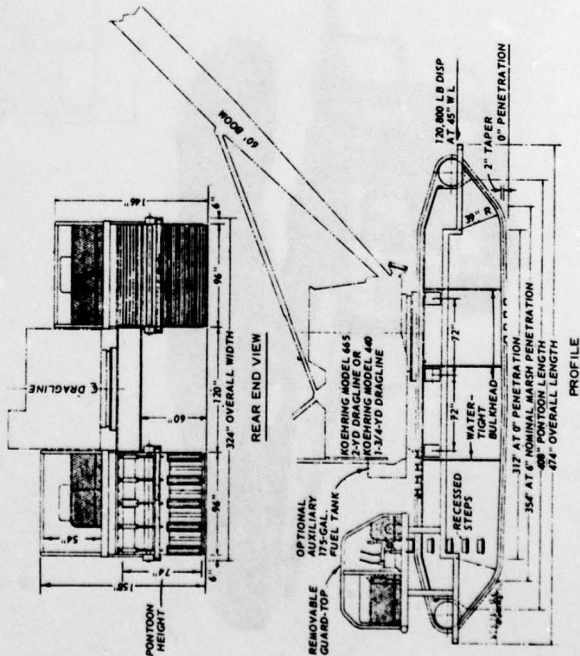
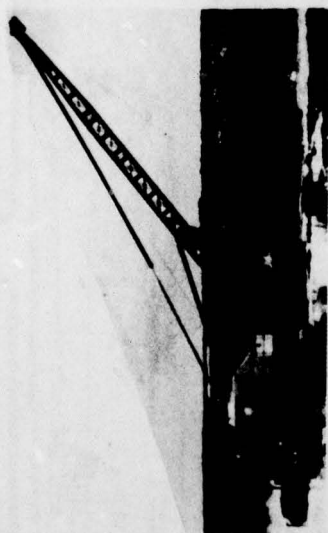
Weight - Basic:	50,700 lb	Maximum Speed - Land:	3-4 mph
Payload:	40,000 lb	- Water:	2-3 mph
Gross Weight:	90,700 lb	Ground Clearance:	60 in.
Ground Pressure - Empty:	0.85 psi	Fording Depth:	AMP in.
- Loaded:	1.51 psi	Maximum Slope Negotiable:	60 %
Overall - Length:	47 1/4 in.	Vehicle Cone Index (1-Pass):	0
- Width:	32 1/4 in.	Vehicle Cone Index (50-Pass):	2
- Height:	in.	Track or Tire Size:	96 x 312 in.
Grouser Height:	51.5 in.		
Sprocket Pitch:	2.0 in.	Tire Pressure:	MA psi
Number of Roadwheels or Bogies per Side:	4		

Mechanical Components Data

Engine -	Suspension: Rigid
Standard: (2) Ford, 380 CID, 6 cylinder, 120 BHP each	
Optional: (2) GM 4-53, 126 BHP each	
Transmission -	Tracks or Wheels: 4 strands of heavy-duty track chain with 4-in. heavy-duty aluminum cleats
Main: Hydrostatic	
Optional:	
Auxiliary:	

Miscellaneous

Primary Use:	Dragline carrier	Cost:	
Potential Uses:	Mount for drill rig, push blade, or pull plow		
Available:	Yes		



Index of Group VI Vehicles, 0 Payload, Bulldozers

<u>Vehicle No.</u>	<u>Vehicle Identification</u>
VI-1	D4D LGP
VI-2	D5 LGP
VI-3	D6C LGP

Specifications for Vehicle No. VI-1  
Vehicle Identification: DAD LOP

Vehicle Manufacturer: Caterpillar Tractor Co.  
Peoria, IL 61602

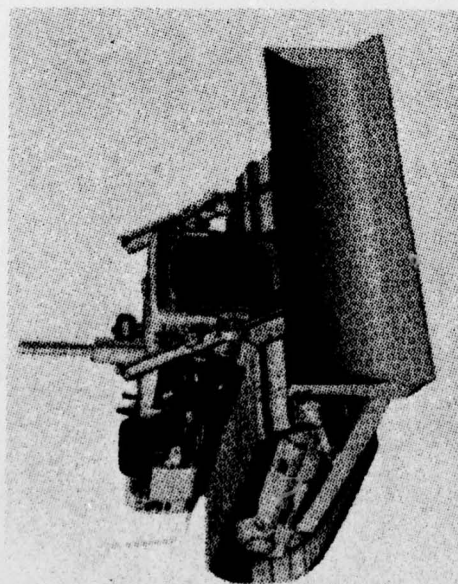
General Data	
Weight - Basic:	20,300 lb
Payload:	0 lb
Gross Weight:	20,300 lb
Ground Pressure - Empty:	3.84 psi
- Loaded:	psi
Overall - Length:	168 in.
- Width:	320 in.
- Height:	95 in.
Crawler Height:	>1.5 in.
Sprocket Pitch:	6.5 in.
Number of Roadwheels or Bogies per Side:	5
Maximum Speed - Land:	5.9 mph
- Water:	0 mph
Ground Clearance:	14 in.
Fording Depth:	in.
Maximum Slope Negotiable:	%
Vehicle Cone Index (1-Pass):	7 *
Vehicle Cone Index (50-Pass):	17 *
Track or Tire Size: 30 x 87 in.	
Tire Pressure:	psi
* Estimated from available data	

#### Mechanical Components Data

Engine -	Suspension: Rigid
Standard: Caterpillar, D-330,	
Optional: 4 cylinder, 75 HP	
Transmission -	Tracks or Wheels:
Main: 5 speed powershift	
Optional:	
Auxiliary:	

#### Miscellaneous

Primary Use: Bulldozer	Cost: _____
Potential Uses:	
Available: Yes	



A66

SKETCH NOT AVAILABLE



Specifications for Vehicle No. VI-2  
Vehicle Identification: D5 LOP

Vehicle Manufacturer: Caterpillar Tractor Co.  
Peoria, IL 61602

#### General Data

Weight - Basic:	29,800 lb	Maximum Speed - Land:	6.2 mph
Payload:	0 lb	- Water:	0 mph
Gross Weight:	29,800 lb	Ground Clearance:	13.5 in.
Ground Pressure - Empty:	29,800 psi	Forcing Depth:	in.
- Loaded:	psi	Maximum Slope Negotiable:	%
Overall - Length:	196.5 in.	Vehicle Core Index (1-Pass):	7 °
- Width:	138.0 in.	Vehicle Core Index (50-Pass):	17 °
- Height:	115.5 in.	Track or Tire Size:	34 x 111 in.
Grouser Height:	>3.5 in.	Tire Pressure:	MA psi
Sprocket Pitch:	6.5 in.		
Number of Roadwheels or Bogies per Side:	7		

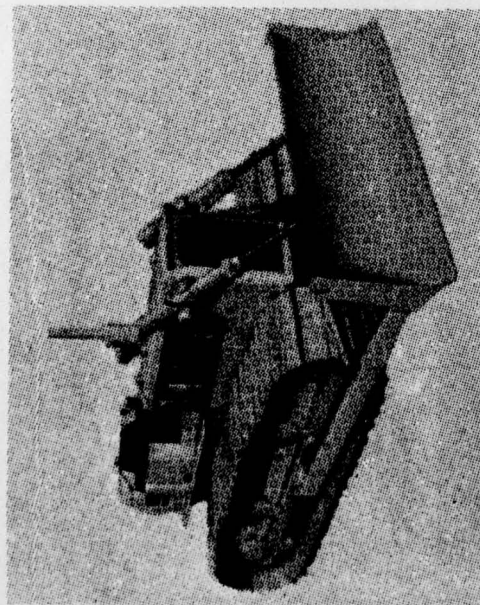
\* Estimated from available data

#### Mechanical Components Data

Engine -		Suspension:	Rigid
Standard:	Caterpillar D333,		
Optional:	6 cylinder, 105 HP		
Transmission -		Tracks or Wheels:	
Main:	5 speed powershift		
Optional:			
Auxiliary:			

#### Miscellaneous

Primary Use:	Bulldozer	Cost:	
Potential Uses:			
Available:	Yes		



SKETCH NOT AVAILABLE



Specifications for Vehicle No. VI-3  
Vehicle Identification: DGC LDP

Vehicle Manufacturer: Caterpillar Tractor Co.  
Peoria, IL 61602

#### General Data

Weight - Basic:	<u>34,100</u> lb	Maximum Speed - Land:	<u>6.9</u> mph
Payload:	<u>0</u> lb	- Water:	<u>0</u> mph
Gross Weight:	<u>34,100</u> lb	Ground Clearance:	<u>14.6</u> in.
Ground Pressure - Empty:	<u>4.18</u> psi	Fording Depth:	<u>  </u> in.
- Loaded:	<u>  </u> psi	Maximum Slope Negotiable:	<u>  </u> %
Overall - Length:	<u>  </u> in.	Vehicle Cone Index (1-Pass):	<u>7</u> *
- Width:	<u>146</u> in.	Vehicle Cone Index (50-Pass):	<u>37</u> *
- Height:	<u>127.5</u> in.	Track or Tire Size:	<u>36.5 x 113.4</u> in.
Grouser Height:	<u>21.5</u> in.	Tire Pressure:	<u>NA</u> psi
Sprocket Pitch:	<u>6.5</u> in.		
Number of Roadwheels or Bogies per Side:	<u>7</u>		

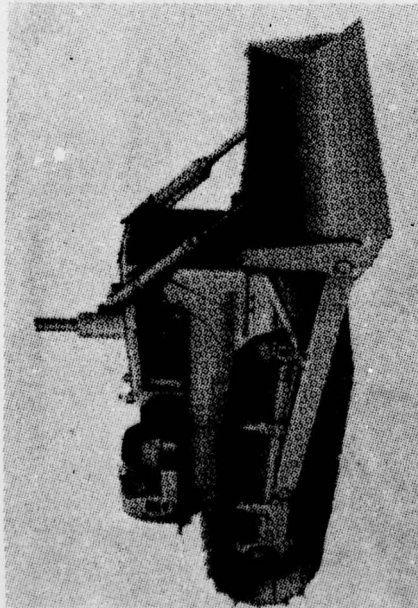
\* Estimated from available data

#### Mechanical Components Data

Engine -	Suspension: <u>Rigid</u>
Standard: <u>Caterpillar, D333</u>	
Optional:	
Transmission -	Tracks or Wheels:
Main: <u>5 speed powershift</u>	
Optional:	
Auxiliary:	

#### Miscellaneous

Primary Use: <u>Bulldozer</u>	Cost: <u>  </u>
Potential Uses:	
Available: <u>Yes</u>	



SKETCH NOT AVAILABLE

## APPENDIX B: CARE AND USE OF SOILS TESTING EQUIPMENT

### Cone Penetrometer

#### Use of the cone penetrometer

1. Inspection. Inspect the penetrometer before using to make sure that all nuts, bolts, and joints are tight and that the dial-gage stem contacts the proving-ring bearing block.

2. Zeroing. Allow the penetrometer to hang vertically from its handle and rotate the dial face until "0" is under the needle. Note that when the instrument is kept vertical between the fingertips and allowed to rest on its cone, the dial will register about 4, or 2 lb, the total weight of the instrument.

3. Operation.

- a. Place the hands over each other on the handle, palms down, and approximately at right angles, as shown in Figure B1, to minimize eccentric loading of the proving ring and to help keep the staff vertical.
- b. Apply force until slow, steady downward movement occurs.
- c. Take a dial reading just as the base of the cone is flush with the ground surface. To do this, watch cone descend until an instant before the cone base is expected to be flush with the ground surface, then immediately shift the vision to the dial face. Continue the slow, steady downward movement at 6 ft/min and take successive dial readings at 1-in. intervals to 6 in., then at 3-in. intervals to 18 in. and at 6-in. intervals to the full 36 in. of shaft. If it is necessary to stop the downward progression of the cone penetrometer for any reason, the progress may be resumed with no adverse effects on cone penetrometer readings. For example, when only one man is on trafficability reconnaissance, he may find it convenient to make two cone penetrometer readings, stop the penetrometer to record the readings, resume the penetration to obtain two additional readings, stop and record, and so on. Note that the use of an assistant increases the speed with which measurements can be made and recorded and usually diminishes the likelihood of errors. Some two-man teams prefer that the assistant merely record the values the operator verbally transmits, while other teams prefer that the assistant announce the proper depth to the operator as well as record the readings.



Figure B1. Cone penetrometer in use



4. Cautions.

- a. Keep the instrument vertical.
- b. Do not attempt to make readings that are higher than the capacity of the dial since this might overstress the proving ring.
- c. If dial capacity is exceeded at less than 18 in. of penetration, make another penetration nearby because the cone might be striking an isolated rock fragment or other hard, small object.
- d. Do not withdraw the instrument by the ring, but always by the staff or the handle.
- e. Be very careful to read the cone index at the proper depth. If readings are actually made as little as 1/4 in. from the proper depth and recorded as being at the proper depth, an average of such readings will not accurately reflect the average strength at that depth. Carelessness in making proper depth determination is probably the greatest source of error in the use of the penetrometer.

Training penetrometer operators

5. Operators should be trained in an area of uniform soil conditions. The instructor should take approximately 50 sets of readings spaced equally over the area. The average cone indexes for 6-in. layers should be computed and used as standards or references. The trainee should be instructed in all proper techniques of operation and should practice penetration under the eye of a qualified instructor until he has become familiar with the techniques of operation. He then should make about 50 sets of readings, using an assistant to record them. The average cone indexes obtained by a trainee should then be compared to the standard. If the trainee's readings deviate widely, the causes for the deviation should be sought and corrected. In a uniform area, 5 percent deviation is considered wide. The most probable cause of error is carelessness in determining proper depth.

6. The rate of progression recommended is such that readings (surface through 36 in.) can be measured in 30 seconds in a continuous penetration in a soft soil. Much slower or faster rates of penetration will reflect lower or higher values, respectively, but the discrepancies



will not be large. Effects on cone index of variation in rate of penetration for the same operator or even between experienced operators are insignificant. The possibility of mechanical imperfections of the cone penetrometer should be investigated if deviations are persistent. Sometimes a needle sticks on a loose dial face or slips on its shaft. Sometimes dial faces are jarred or otherwise rotated around the shaft of the dial, causing an improper zero setting. A damaged or overstressed ring might even require recalibration. A micrometer dial stem may not have been in good contact with the proving-ring bearing block when the instrument was zeroed.

#### Care and adjustment of the penetrometer

7. General care. Little care is required beyond keeping the penetrometer free from dirt and rust, keeping all parts tight, and frequently checking and, if necessary, rezeroing the instrument. Particular care should also be taken to see no grit is caught between the stem of the dial and the lower mounting block.

8. Dial. The micrometer dial is a sensitive instrument that should be protected against water and rough usage. It should never be immersed in water and should be wiped dry as soon as possible after its use in rainy weather. When transported by truck, the dial should be cushioned by wrapping it in paper or cloth.

#### Hvorslev Soil Sampler

9. A pistontype soil sampler is used to extract soil samples for remolding tests. To use the sampler, hold the disk at the top of the piston rod firmly with one hand to prevent vertical movement of the piston and force the sampling tube into the soil with the other hand (top photo, Figure B2a). In firm soils, two men often are needed to force the sampler into the soil. After locking the piston rod by turning the knurled handle, twist the instrument slightly and withdraw. The sample may then be placed directly into the remolding cylinder (Figure B2b), or used for other soils identification purposes.

10. It is essential to keep the inside of the sampling tube, the



a. Taking sample



b. Loading remolding cylinder



c. Measuring cone index in remolding cylinder



d. Applying hammer blows

Figure B2. Remolding test operation

piston ring, and the leather washer reasonably clean. After 5 to 25 samplings, depending upon the type of soil, immerse the tube first in water and then in fuel oil, working the piston up and down 5 or 6 times in each liquid. Wipe off the excess fuel oil, then squirt light machine oil into the tube. If the instrument becomes stiff and hard to work, remove the tube, disassemble, and thoroughly clean the piston and oil the leather washer. Tube walls and cutting edges are comparatively soft and should be handled with some care.

11. The effective piston-rod length should be adjusted to keep the face of the piston flush with the cutting edge of the tube when the piston rod handle (disk) is fully depressed. This is done by loosening the setscrew on the handle, screwing the handle up or down to the correct position, and retightening the setscrew.

#### Remolding Equipment

12. The equipment for the remolding test consists of a steel cylinder approximately 2 in. in diameter and 8 in. long, mounted on an aluminum base, a 2-1/2-lb steel drophammer sliding on an 18-in. steel staff with handle, and a cone penetrometer. The cone penetrometer may be equipped with either the aluminum shaft with the 0.5-sq-in. cone (for fine-grained soils) or more slender steel shaft with the 0.2-sq-in. cone (for remoldable sands). The penetrometer is used to measure soil strength in the cylinder before and after remolding. The Hvorslev sampler is used to obtain the soil sample and place it in the remolding cylinder.

13. The testing is as follows. Take a sample with the sampler (Figure B2a), eject it directly into the remolding cylinder (Figure B2b), and push it to the bottom of the cylinder with the foot of the drophammer staff. Measure the strength with the penetrometer by taking cone index readings as the base of the cone enters the surface of the soil sample and at each successive inch to a depth of 4 in. (Figure B2c). Next, apply 100 blows with the drophammer falling 12 in. (Figure B2d), and measure the remolded strength from the surface to the 4-in.



depth at 1-in. increments, as was done before remolding. Occasionally, a sample is so hard that it cannot be penetrated the full 4 in. In such cases the full capacity of the dial (300) is recorded for each inch below the last reading obtained. The sum of the five cone index readings after remolding divided by the sum of the five cone index readings before remolding gives the remolding index.



In accordance with letter from DAEN-RDC, DAEN-ASI dated 22 July 1977, Subject: Facsimile Catalog Cards for Laboratory Technical Publications, a facsimile catalog card in Library of Congress MARC format is reproduced below.

Willoughby, William E

Assessment of low-ground-pressure equipment for use in containment area operation and maintenance / by William E. Willoughby. Vicksburg, Miss. : U. S. Waterways Experiment Station ; Springfield, Va. : available from National Technical Information Service, 1978.

31, 68, 7 p. : ill. ; 27 cm. (Technical report - U. S. Army Engineer Waterways Experiment Station ; DS-78-9)

Prepared for Office, Chief of Engineers, U. S. Army, Washington, D. C.

References: p. 31.

1. Containment areas. 2. Dredged material disposal. 3. Ground flotation. 4. Guidelines. 5. Low-ground-pressure equipment. 6. Soft soils. 7. Vehicle performance. 8. Waste disposal sites. I. United States. Army. Corps of Engineers. II. Series: United States. Waterways Experiment Station, Vicksburg, Miss. Technical report ; DS-78-9.  
TA7.W34 no.DS-78-9